

(NASA-CR-135239-Vol-1-Sect-3) ACOUSTIC
TESTS OF DUCT-BURNING TURBOFAN JET NOISE
SIMULATION: COMPREHENSIVE DATA REPORT.
VOLUME 1, SECTION 3: DATA PLOTS Final
Report (General Electric Co.) 520 p

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COMPREHENSIVE DATA REPORT

VOLUME I

SECTION III
DATA PLOTS

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General Electric

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
LEWIS RESEARCH CENTER
21000 BROOKPARK ROAD
CLEVELAND, OHIO 44135



NASA CONTRACT: NAS3-18008



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Volume II

Part 1.	"Concept Screening and Model Design for Acoustic Tests of Duct-Burning Turbofan Jet Noise Simulation," J.F. Brausch and P.S. Staid, General Electric AEG TM-74-270, June 1974.
Part 2.	"Hot/Cold Flow Model Tests to Determine Static Performance of Duct Noise Suppression Nozzles," R.A. Kirschbaum and R.G. Brasket, FluidDyne Engineering Corporation Report 1008, July 1974.

4.0 ACOUSTIC PLOTS

4.1 Acoustic Comparison of Various Nozzle Models at Selected Test Conditions for a Full Size Engine

The data from the full size engine utilizing a scale factor of 8 was plotted for $V_f/V_c \geq 1.5$ at 3 test conditions corresponding to acoustic test matrix points of X 13, X 15, X 25 (where X is the model designation in Section 3.0 (a) of CDR Volume I. These were included in the Final Report, NASA CR 2966, in reduced form. The following plots are in original size for easier detailed analysis. The plots include:

- OASPL directivity
- PNL directivity
- PWL spectra
- SPL spectra at 50°, 90°, 130° and angle corresponding to max.PNL

The solid lines in the OASPL and PNL directivity curves represent a synthesized conical nozzle.

4.2 Acoustic Data Plots for a Full Size Engine Utilizing a Scale Factor of 8

The following plots are presented for a full size engine utilizing a scale factor of 8. GE high frequency atmospheric attenuation factors have been used.

Ground reflection corrections have been applied to the model data prior to scaling.

The spectral data is presented on the basis of 1/3 octave band analysis.

The angular distribution of overall sound pressure levels and perceived noise levels are presented at a microphone location consistent with a FAR36 regulation monitoring location - 2128 ft (648.6 m) sideline and 1110 ft (338.3 m) altitude.

Four types of figures have been used per configuration to present the acoustic data.

The first set of figures shows the effect of velocity and temperature on sound power generation as indicated by sound power level spectra.

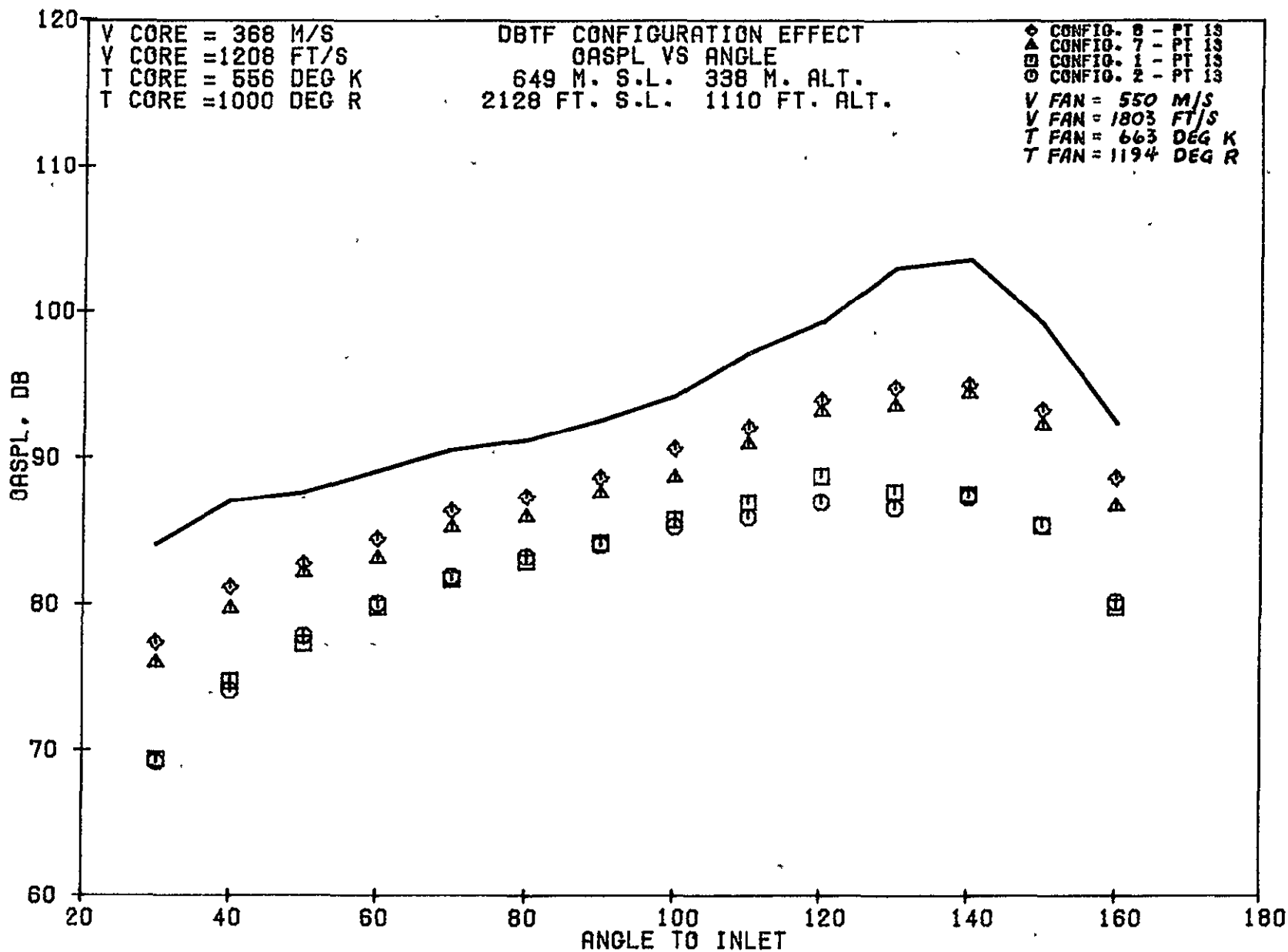
The second set shows the effect of velocity and temperature upon sound generation as indicated by overall sound pressure level sideline directivities

The third set shows the effect of velocity and temperature upon noise generation as indicated by changes in perceived noise level along the sideline.

The fourth set shows the effect of velocity and temperature upon sound propagation as indicated by sound pressure level spectra at 50°, 90°, and 130°.

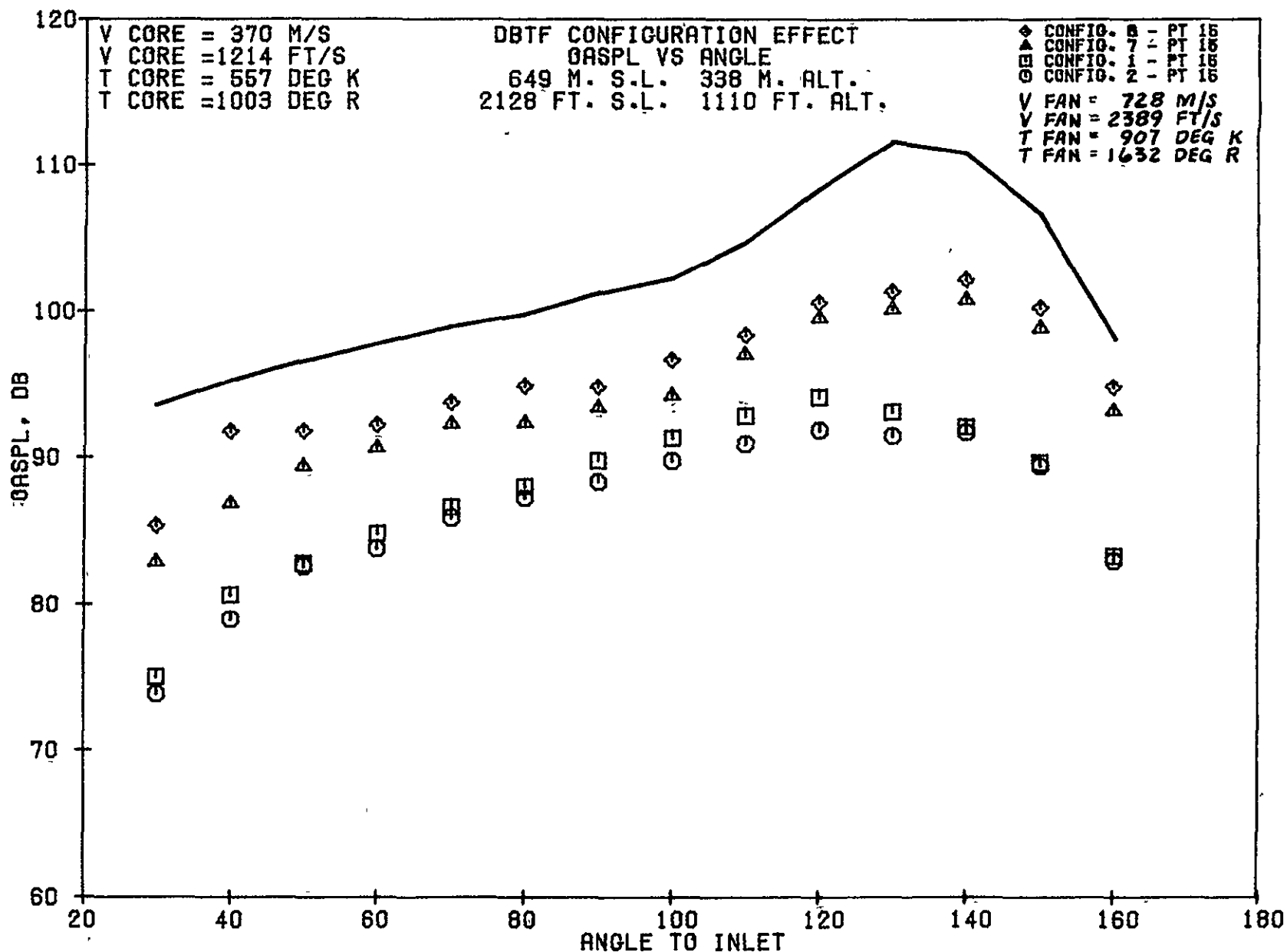
The plots demonstrate the effect of four basic parameters; fan velocity, core velocity, fan stream temperature and core stream temperature. Some general observations relating to these parameters can be made in terms of the power level spectra. The unsuppressed configurations, (Models 7 and 8), have little variation in their spectra when $V_f/V_c \lesssim 1.0$. The sound power is basically core stream controlled and peaks at low frequencies. When $V_f/V_c > 1.0$, then a second frequency peak occurs at mid frequencies. This is attributed to the high fan radius ratio effects. When the fan stream temperature is increased, sound power levels were reduced, but conversely increases in the core stream temperature leads to small increases in sound power level. The suppressed configurations follow similar trends except that increasing the fan velocity increases the sound power more predominantly in the mid to high frequency regime.

4.1 ACOUSTIC COMPARISON OF VARIOUS NOZZLE MODELS AT SELECTED TEST CONDITIONS FOR A FULL SIZE ENGINE



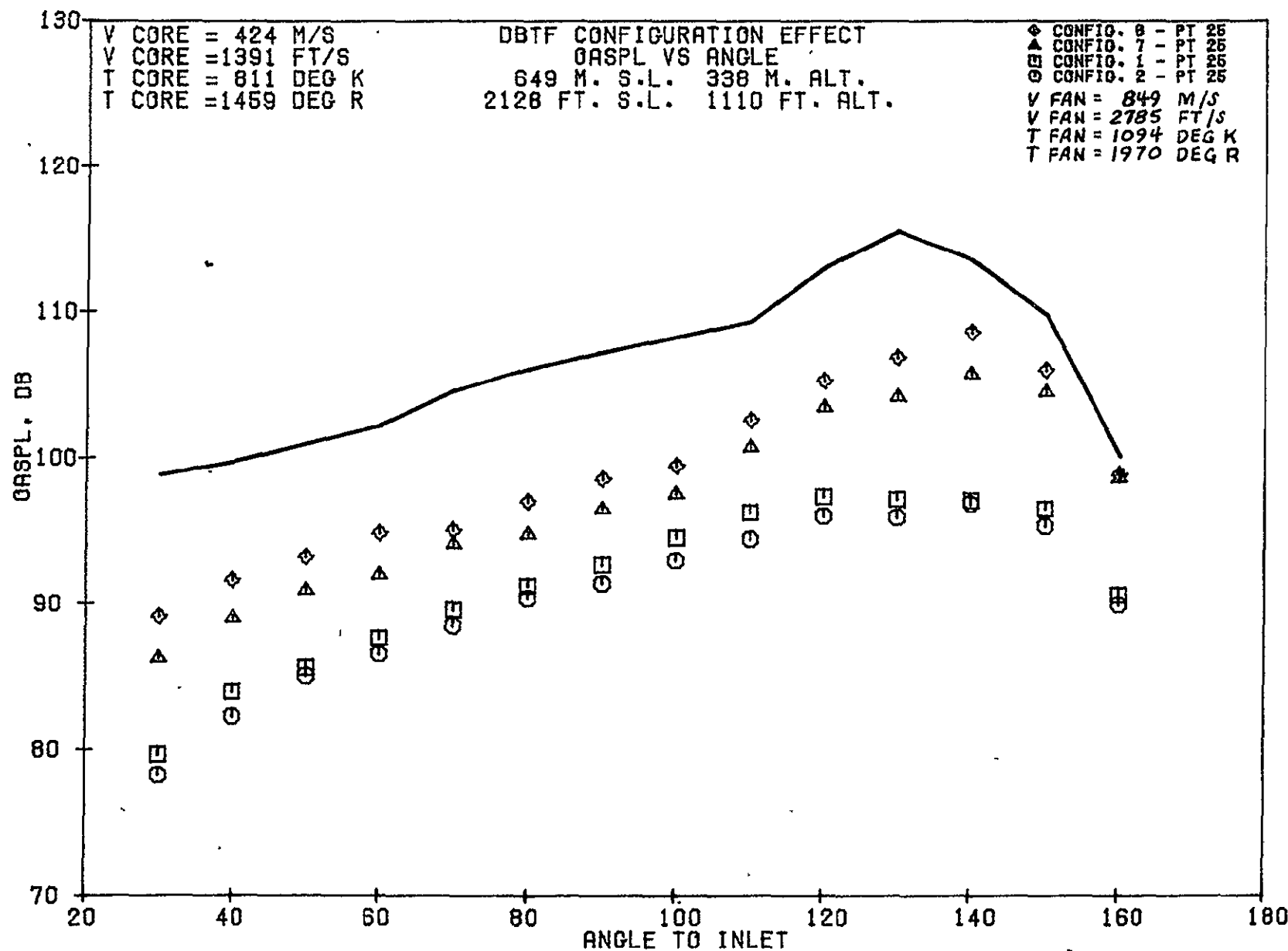
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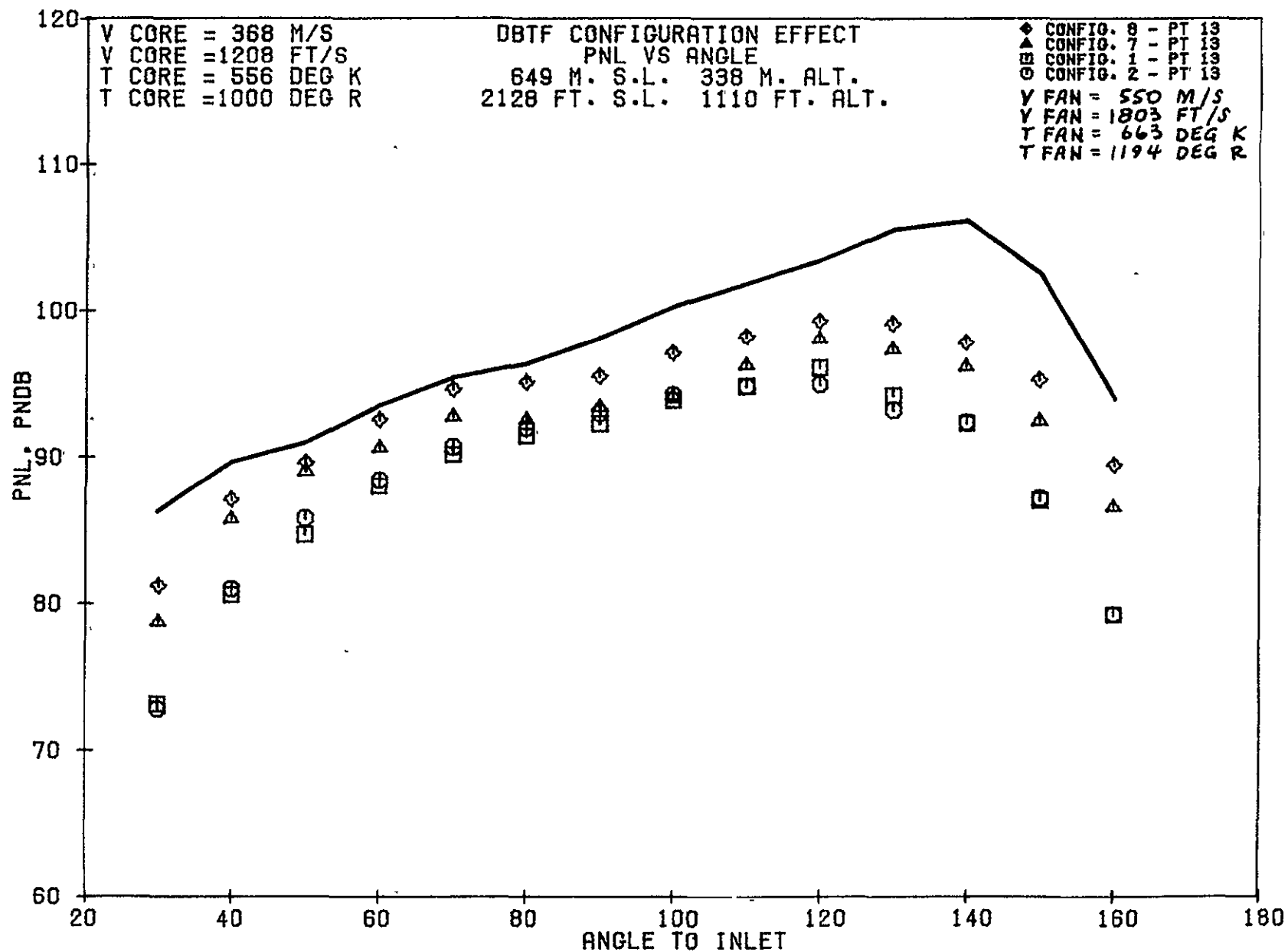


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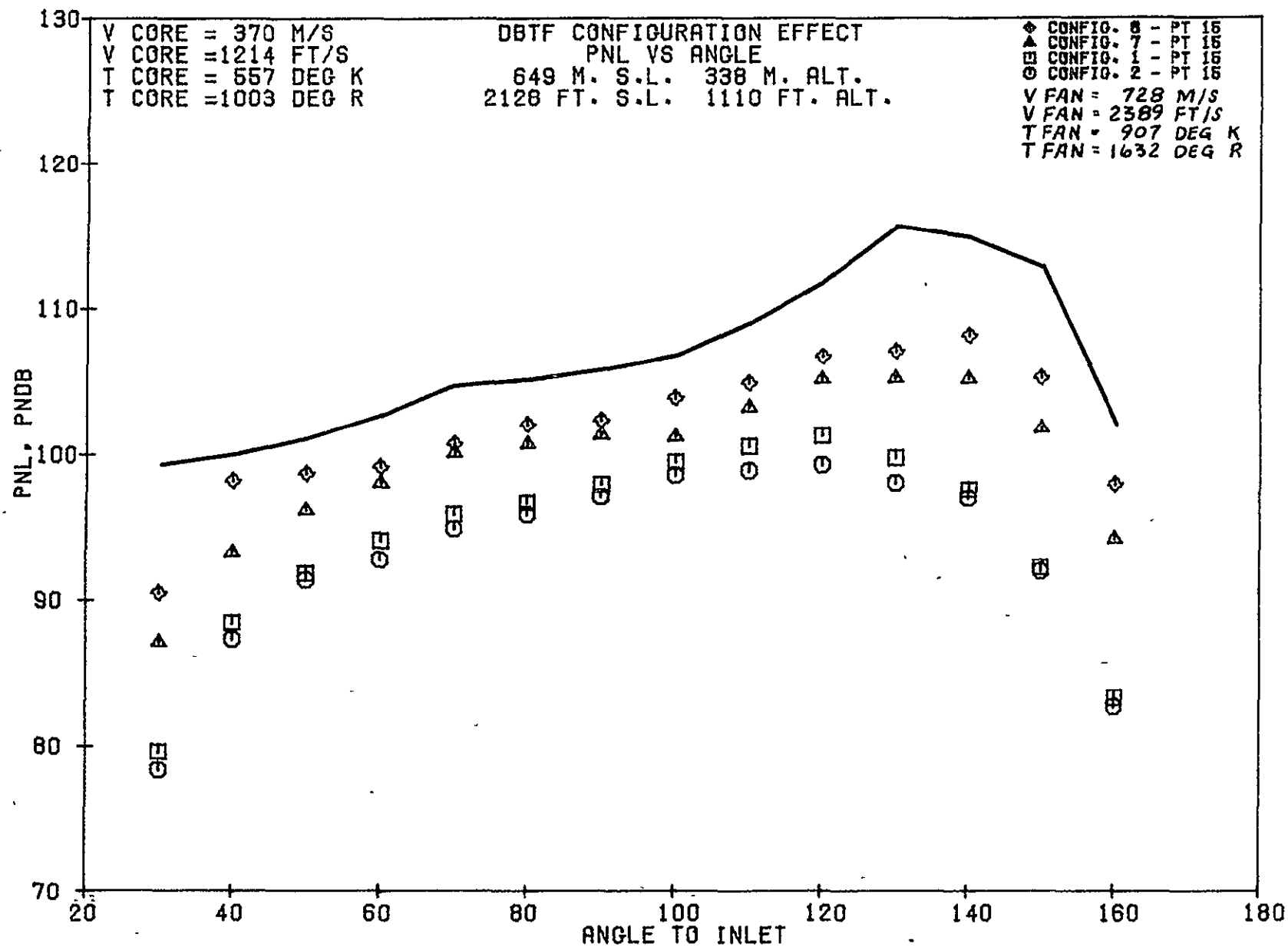


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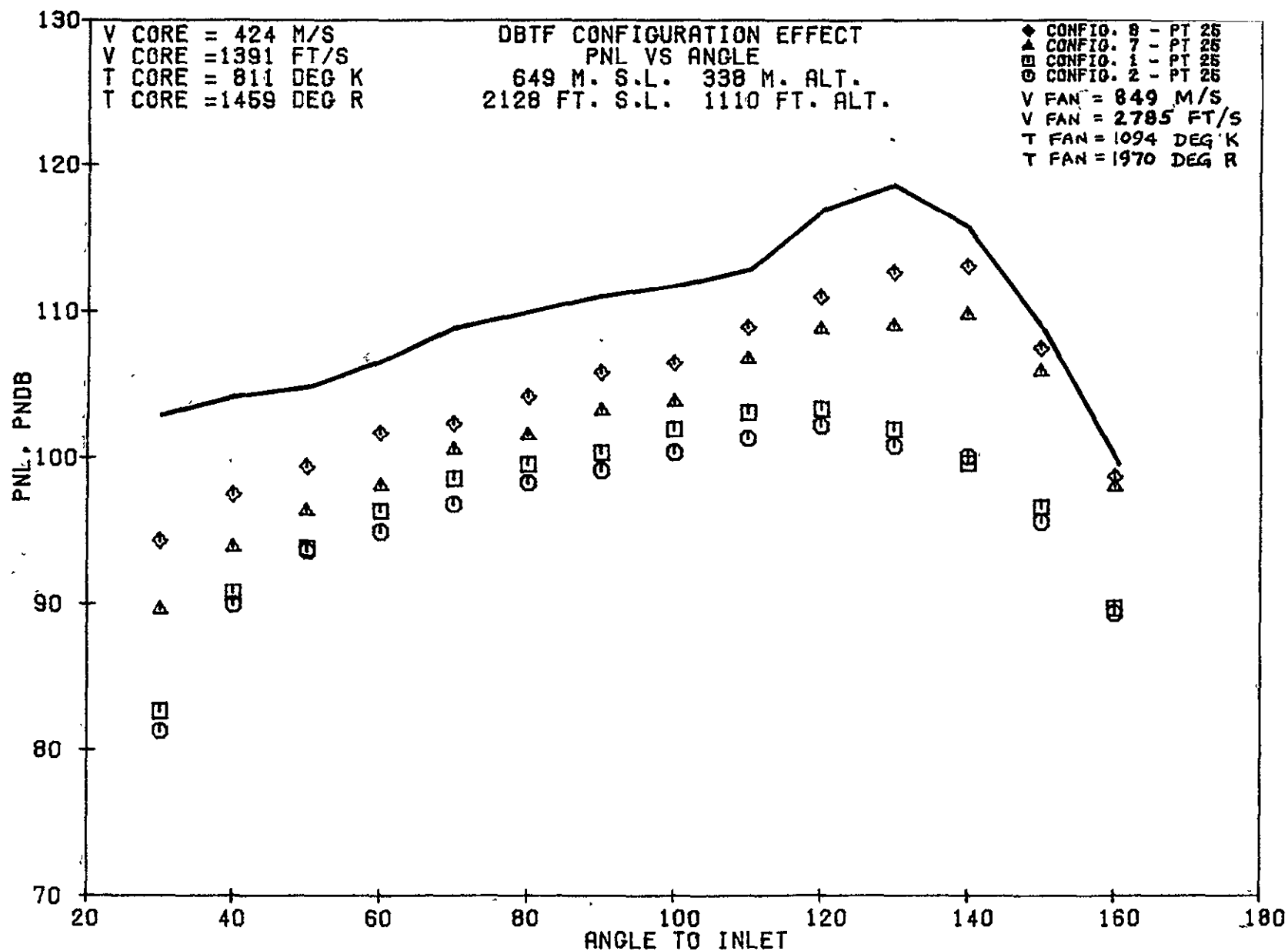
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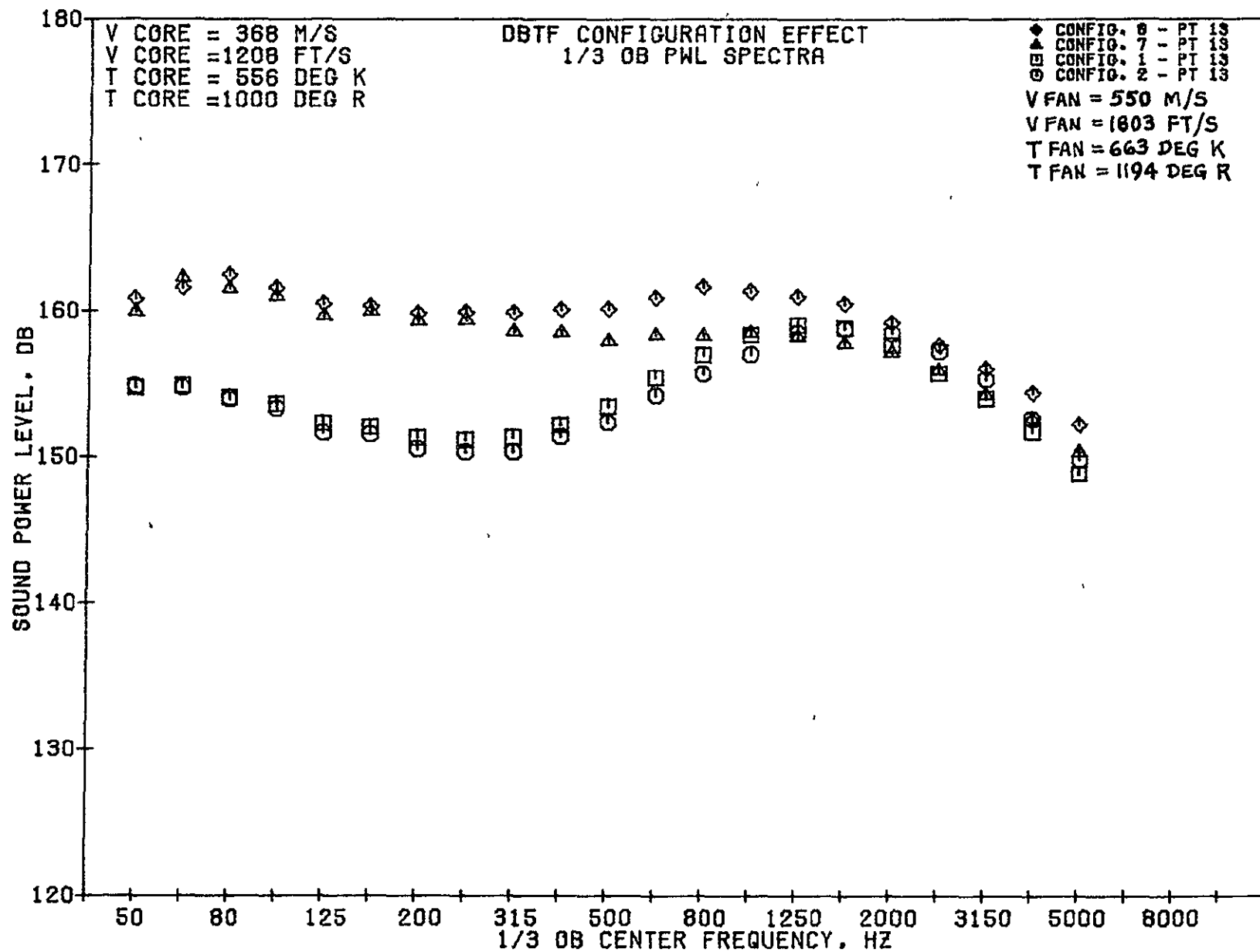
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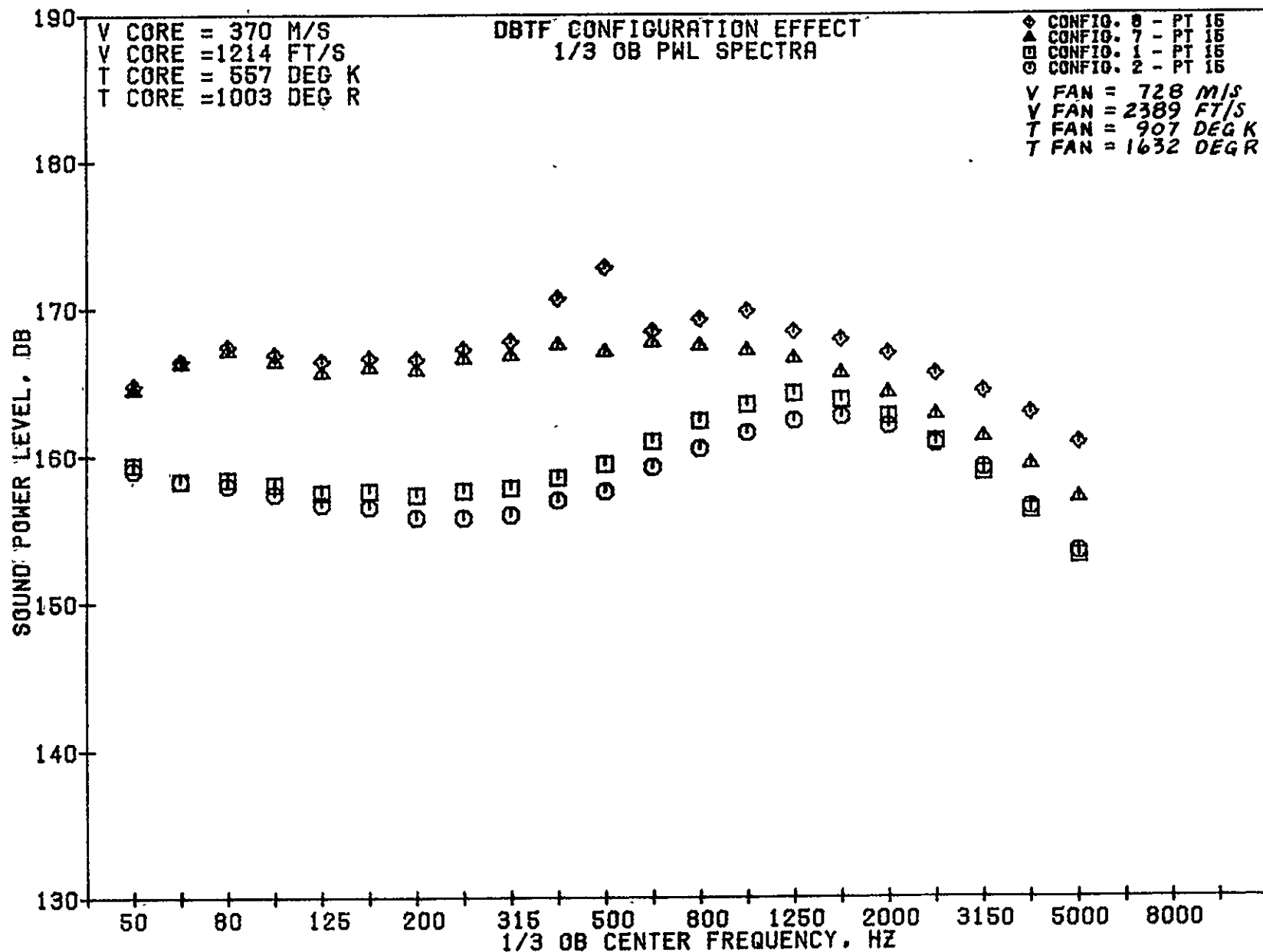


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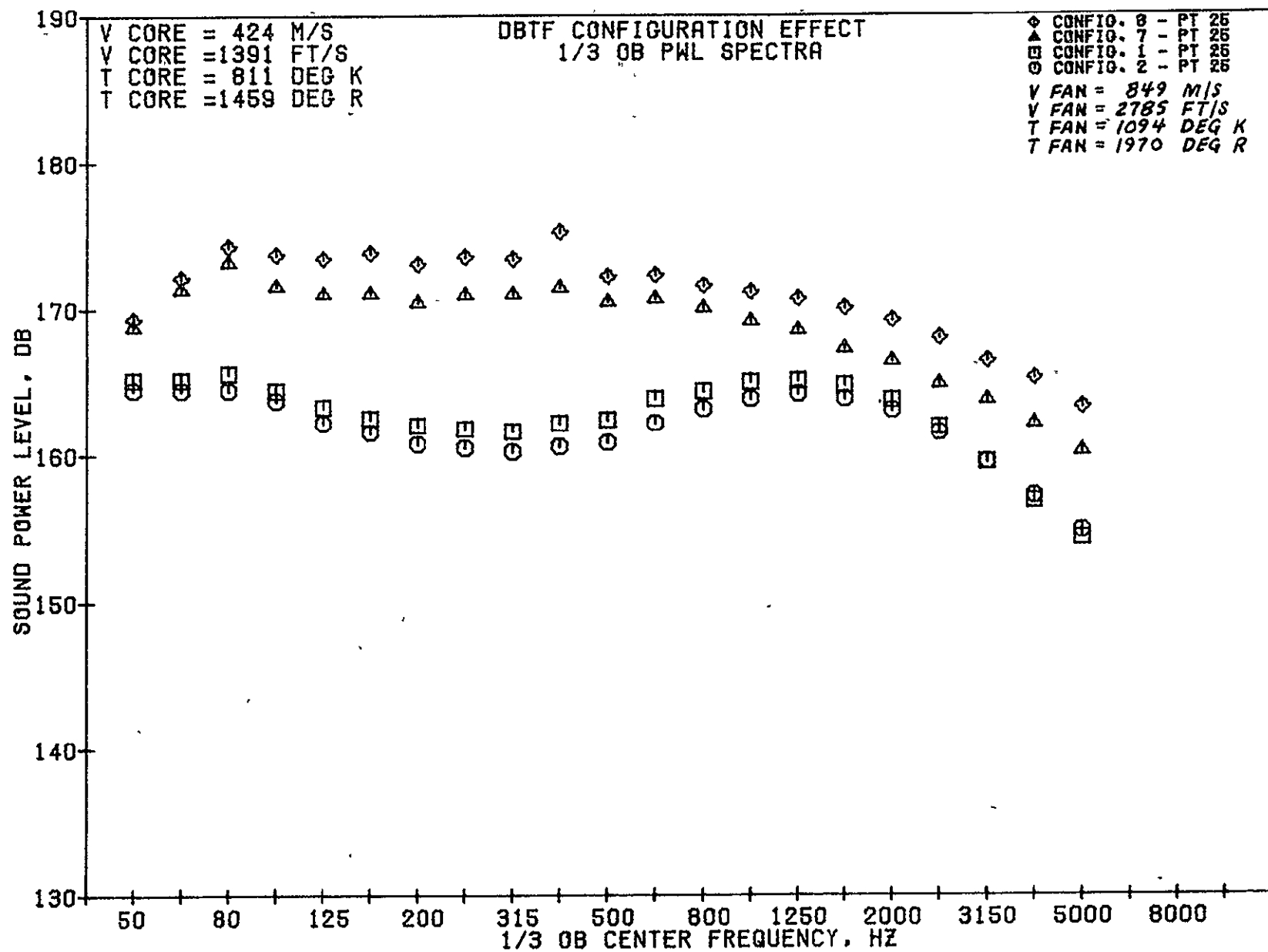


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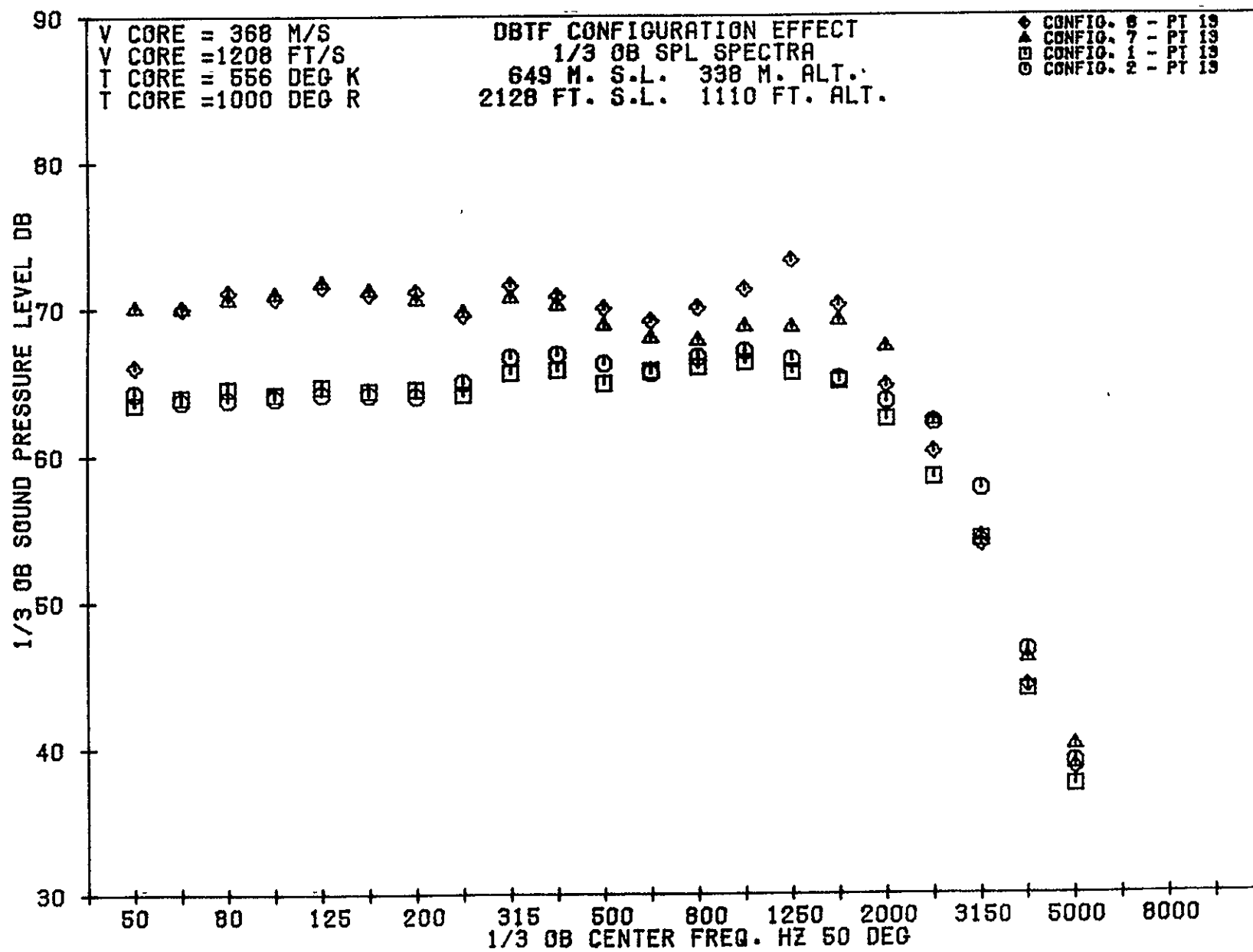


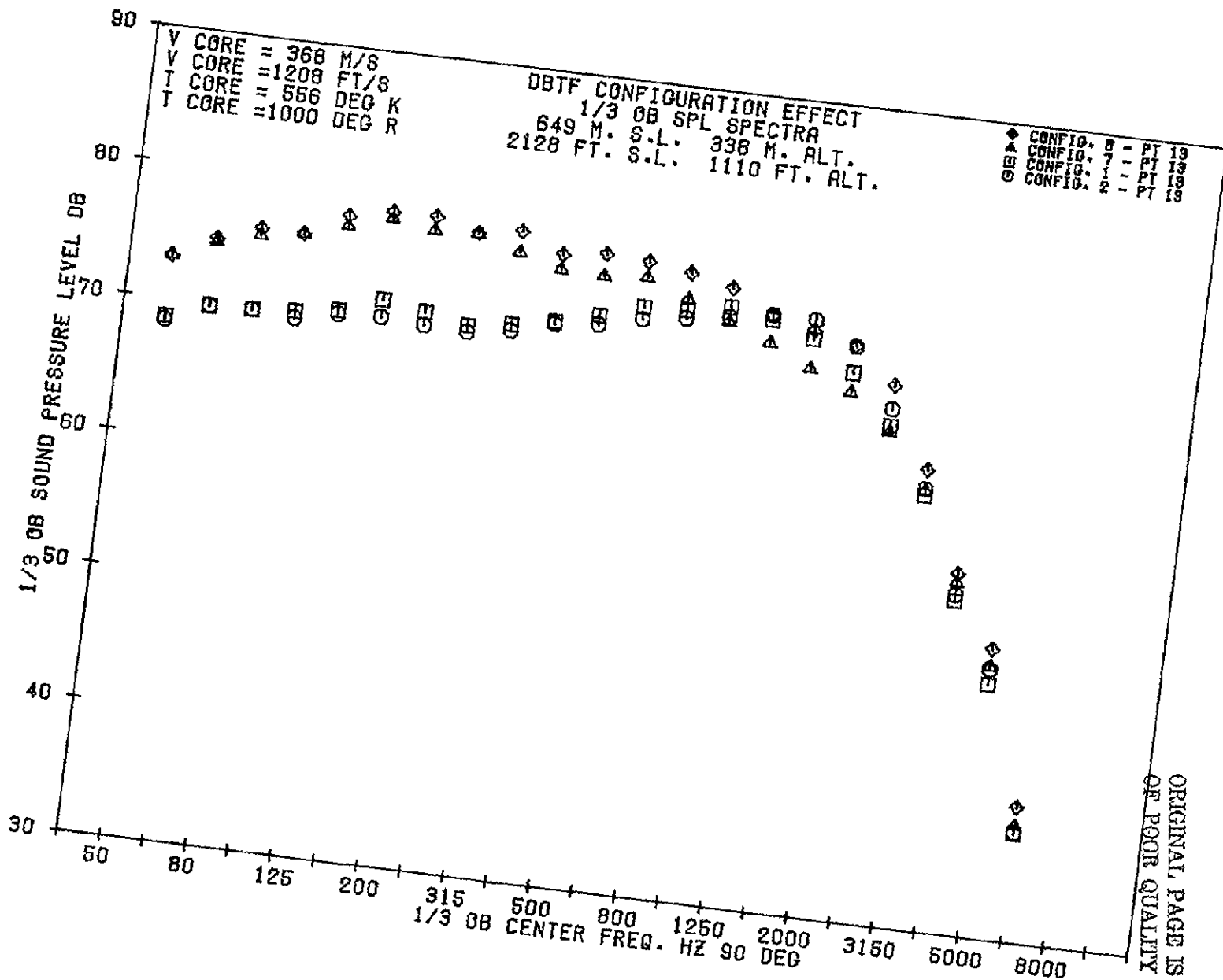
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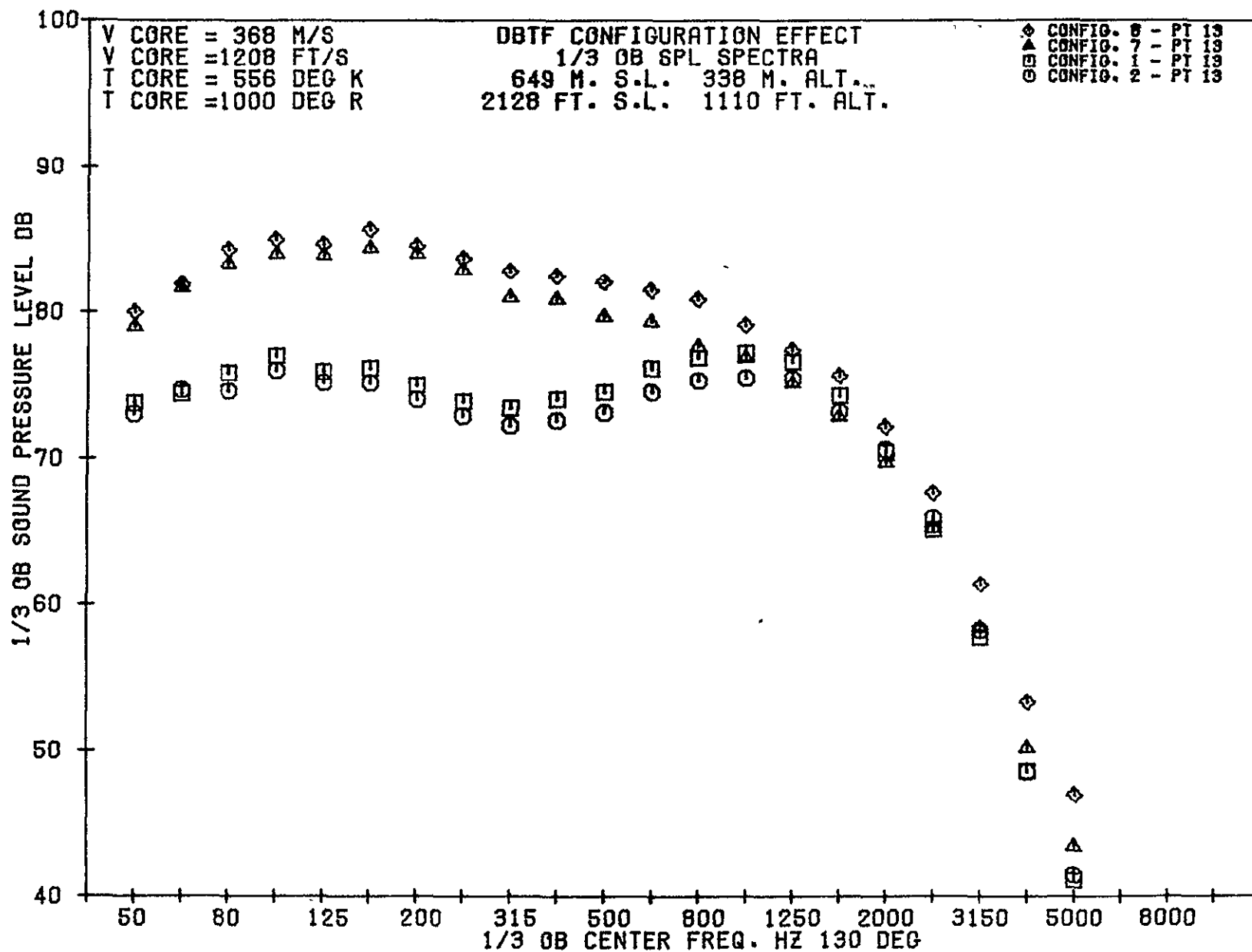
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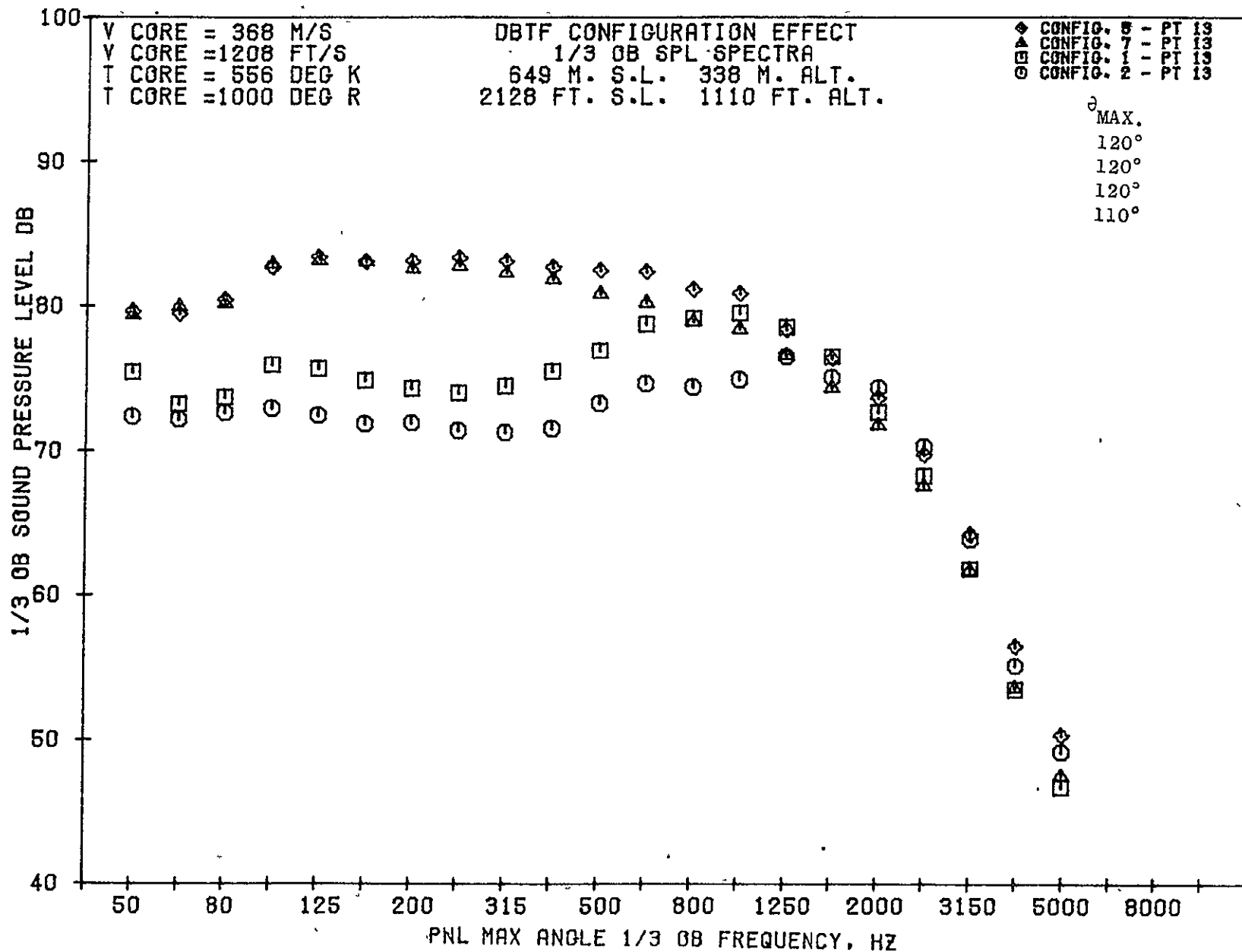


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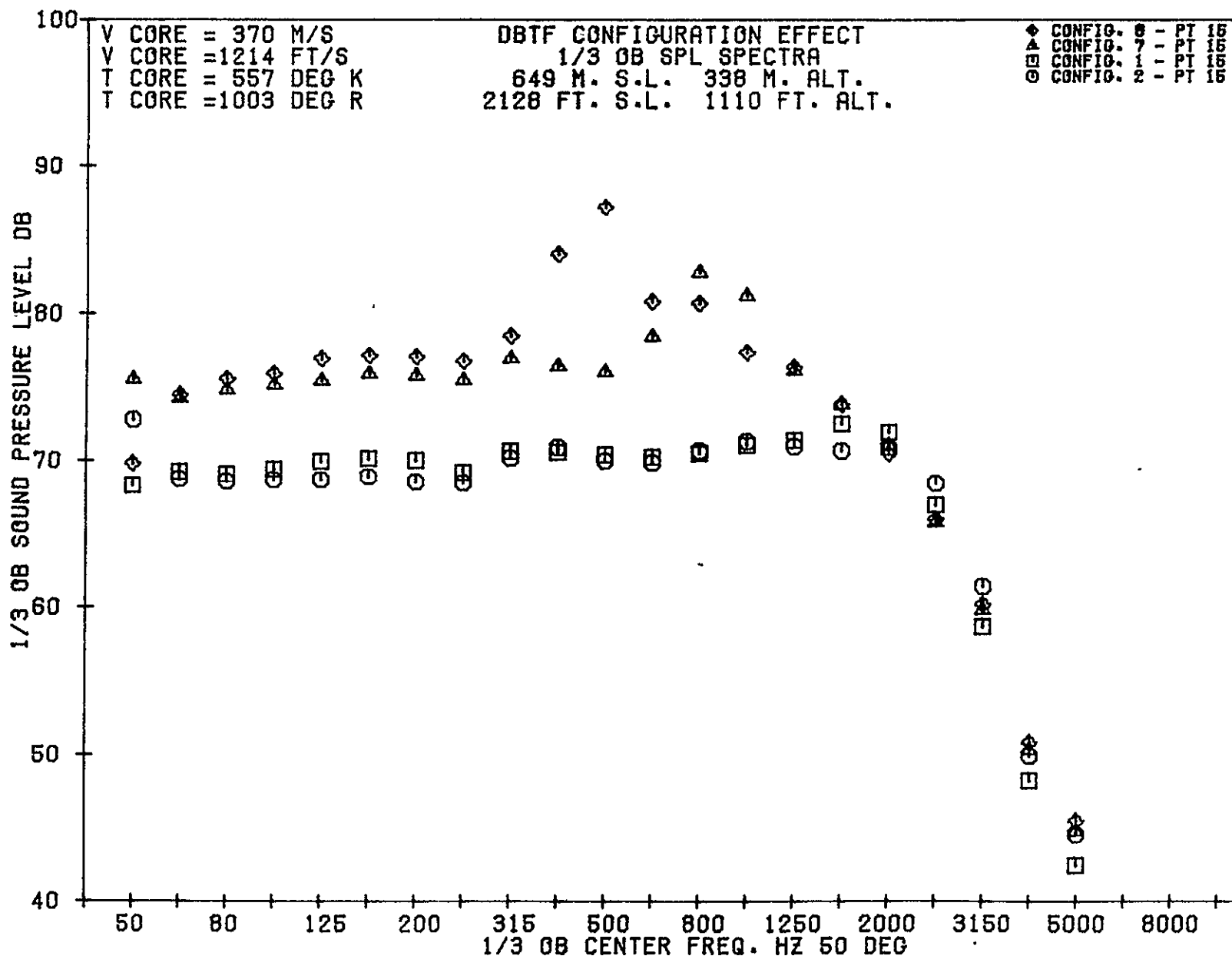




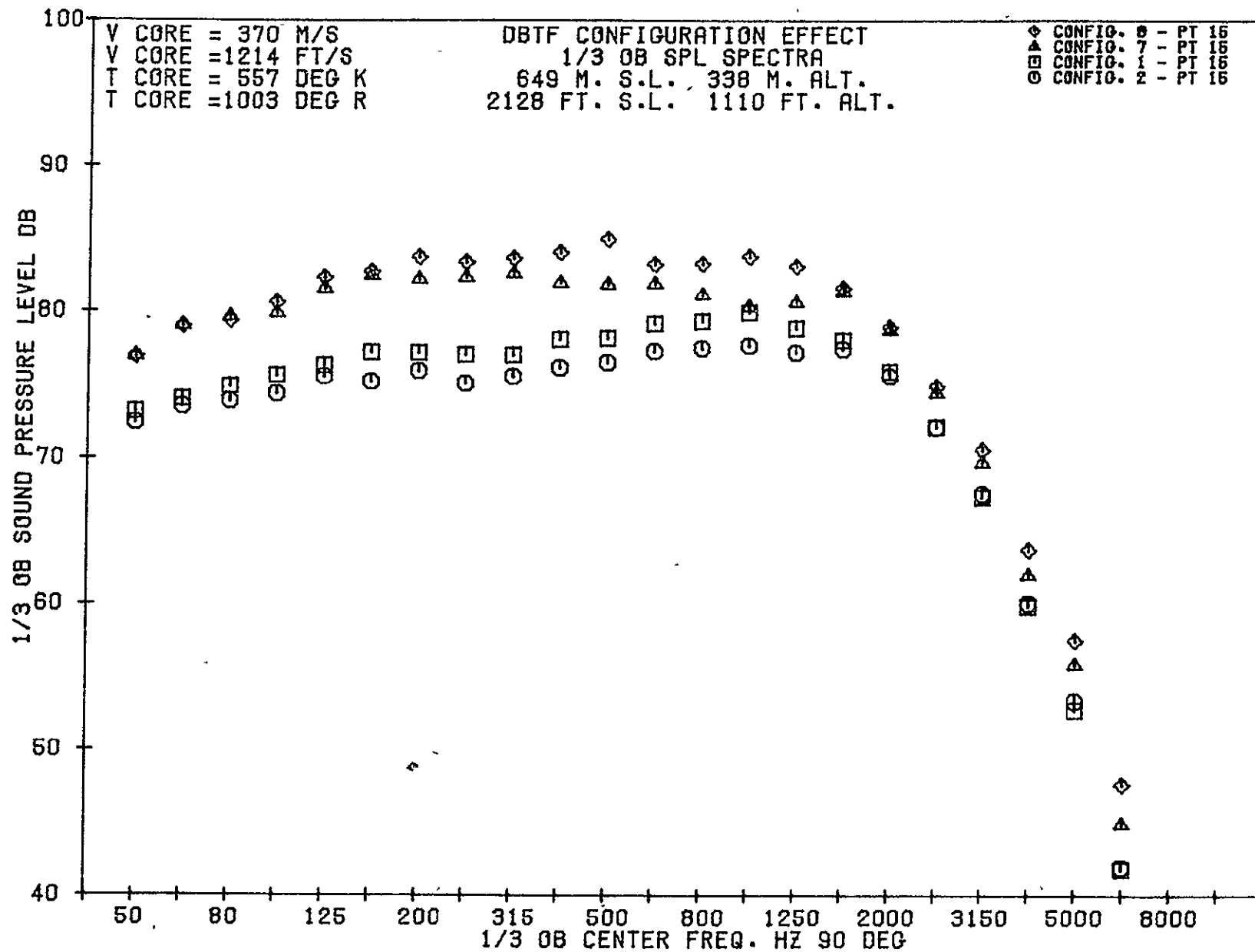


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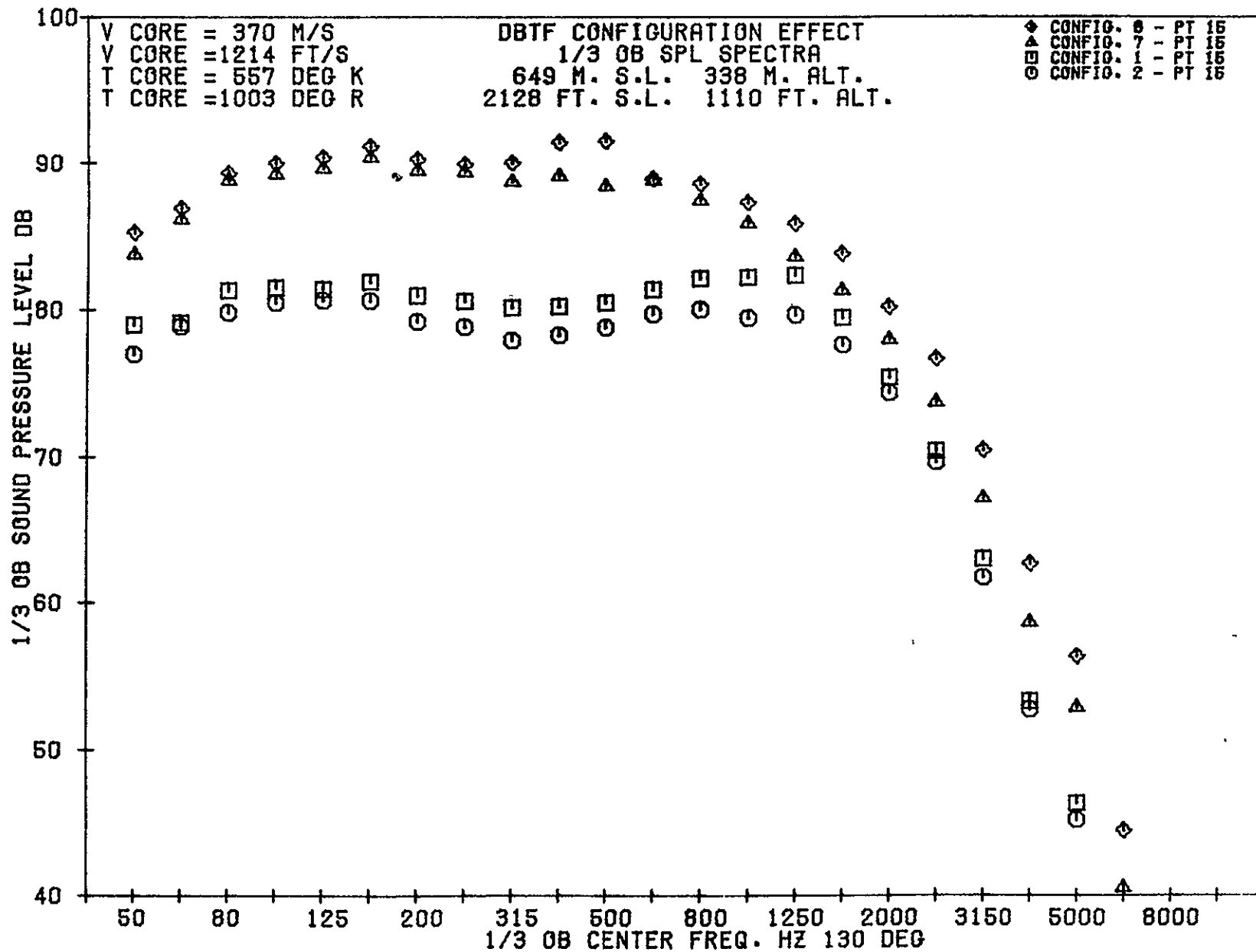
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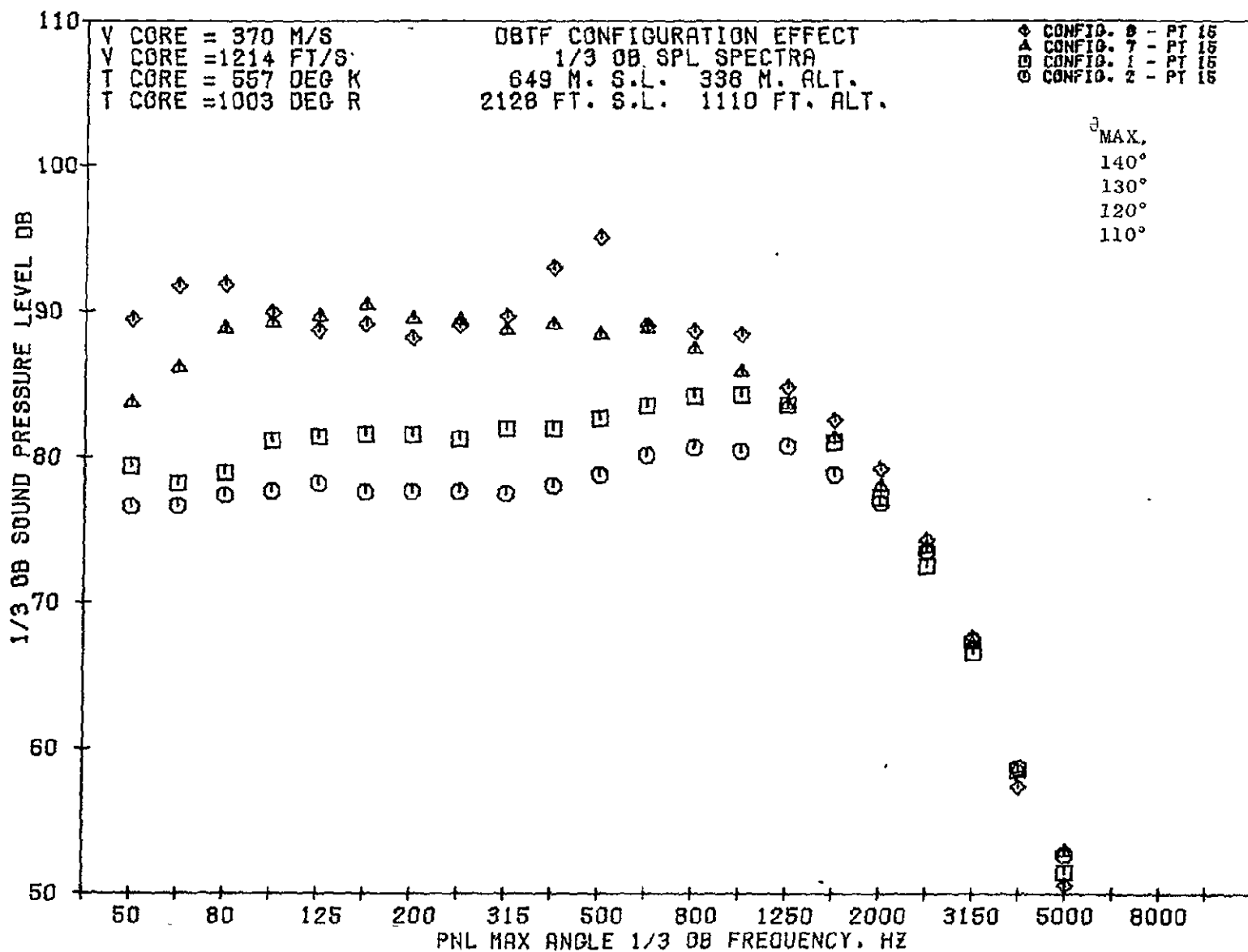
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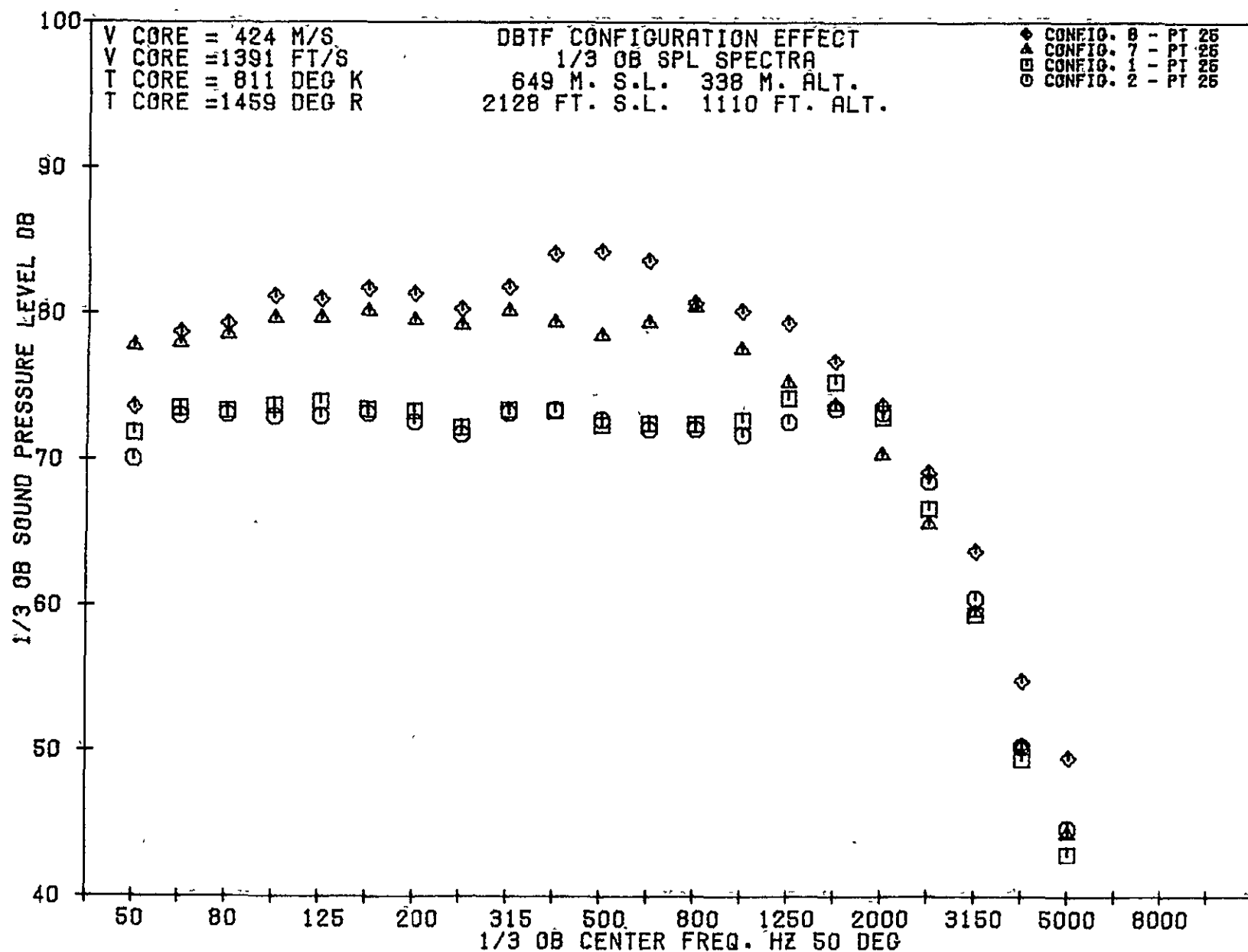


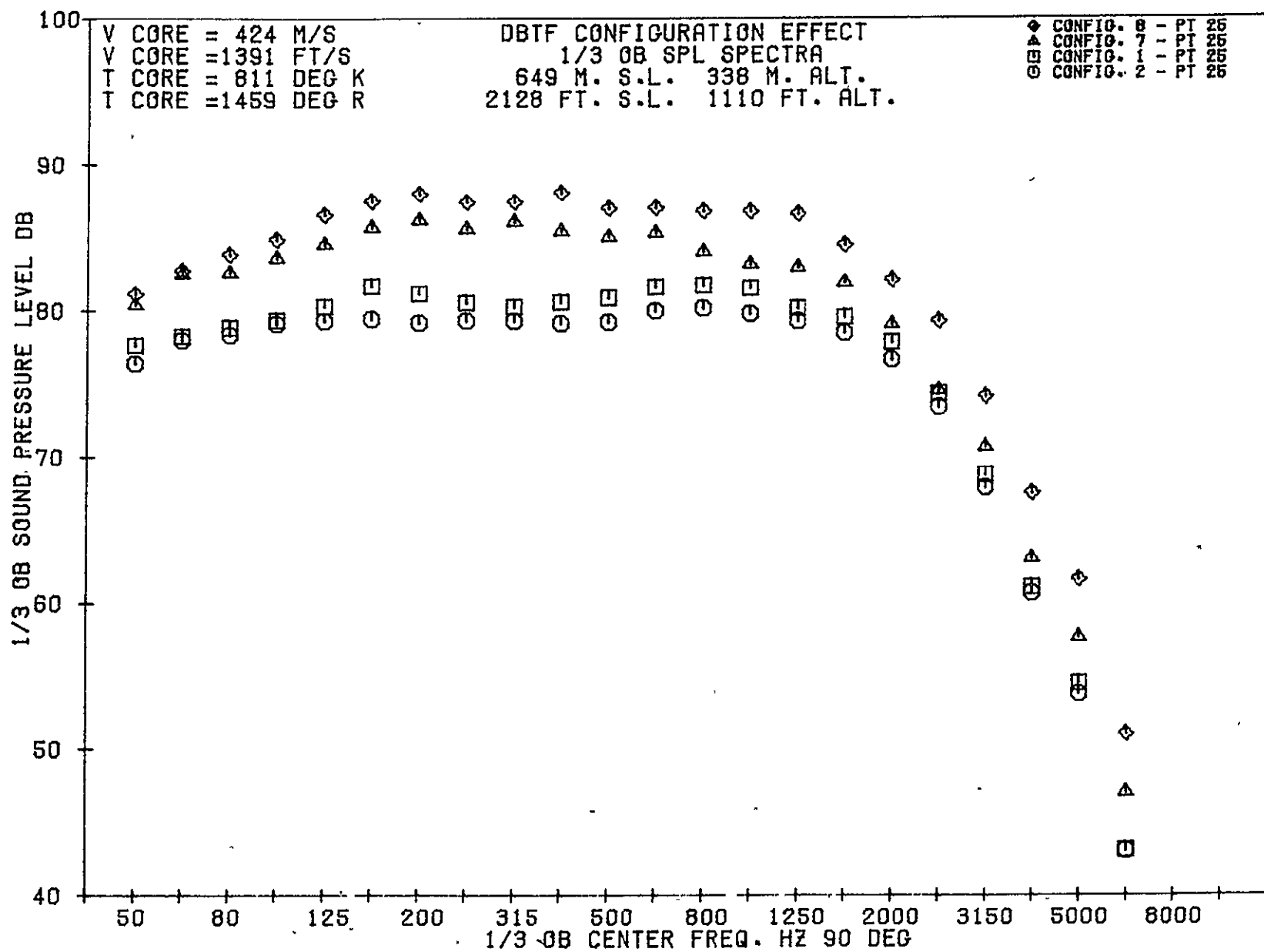
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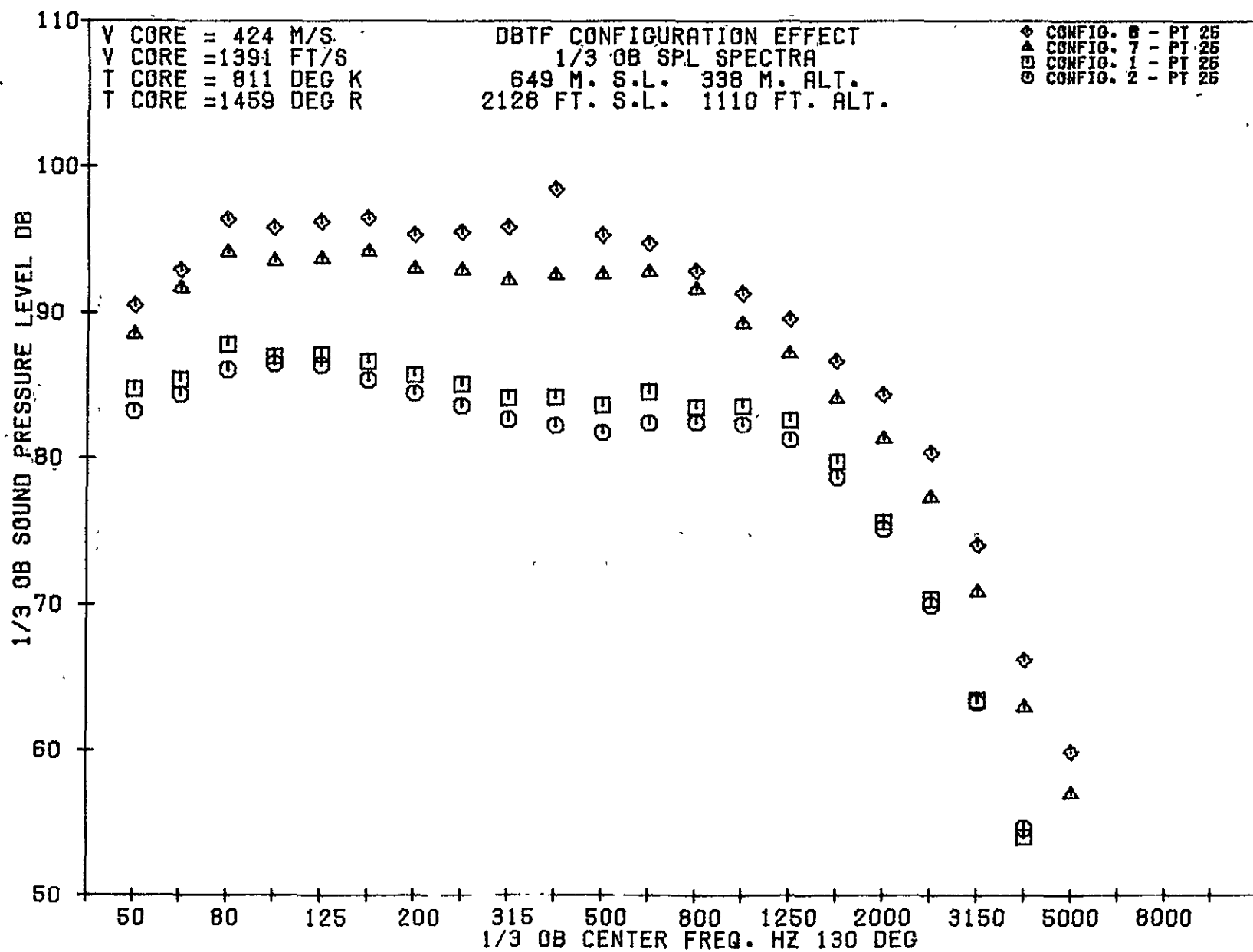


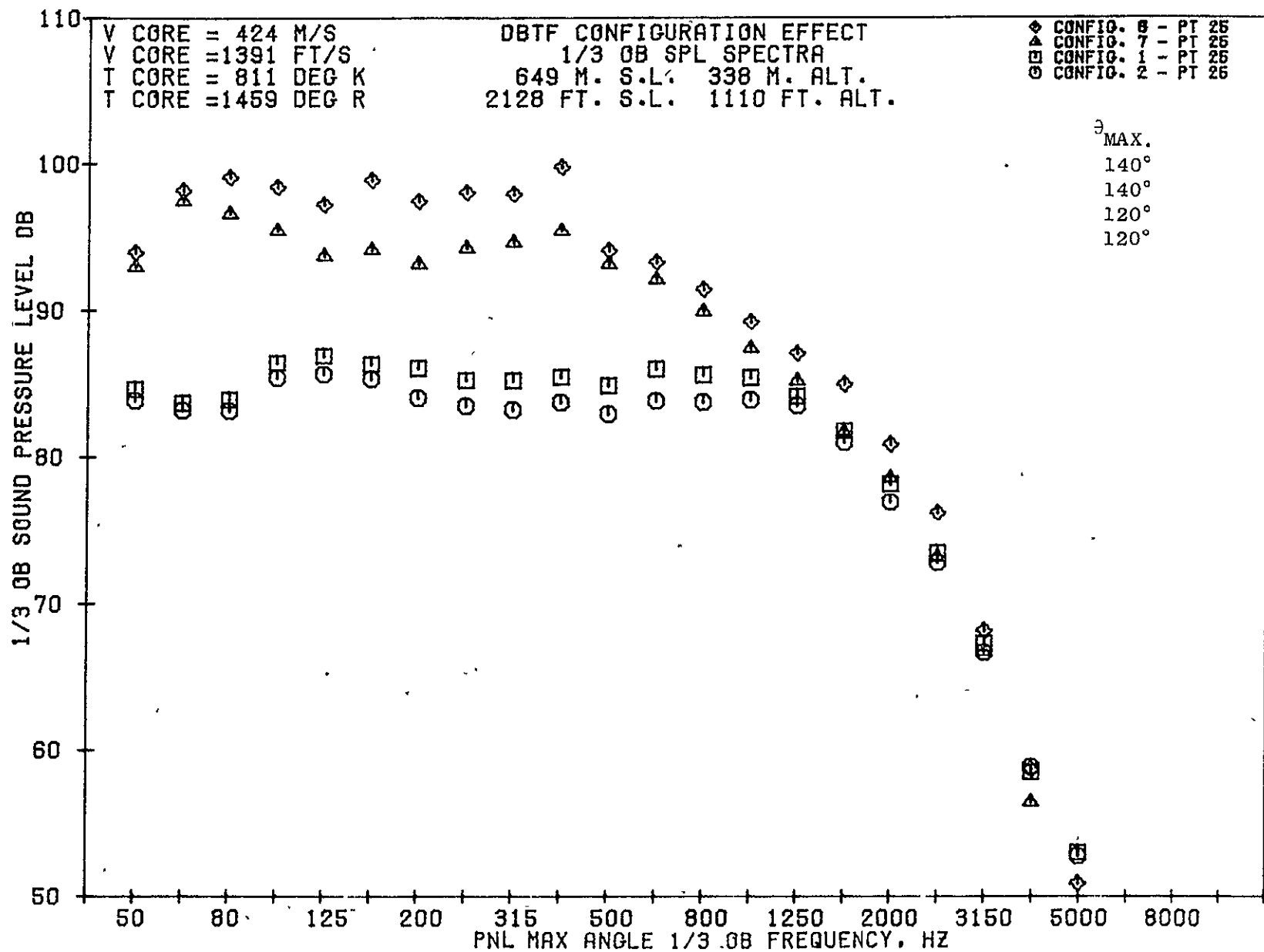
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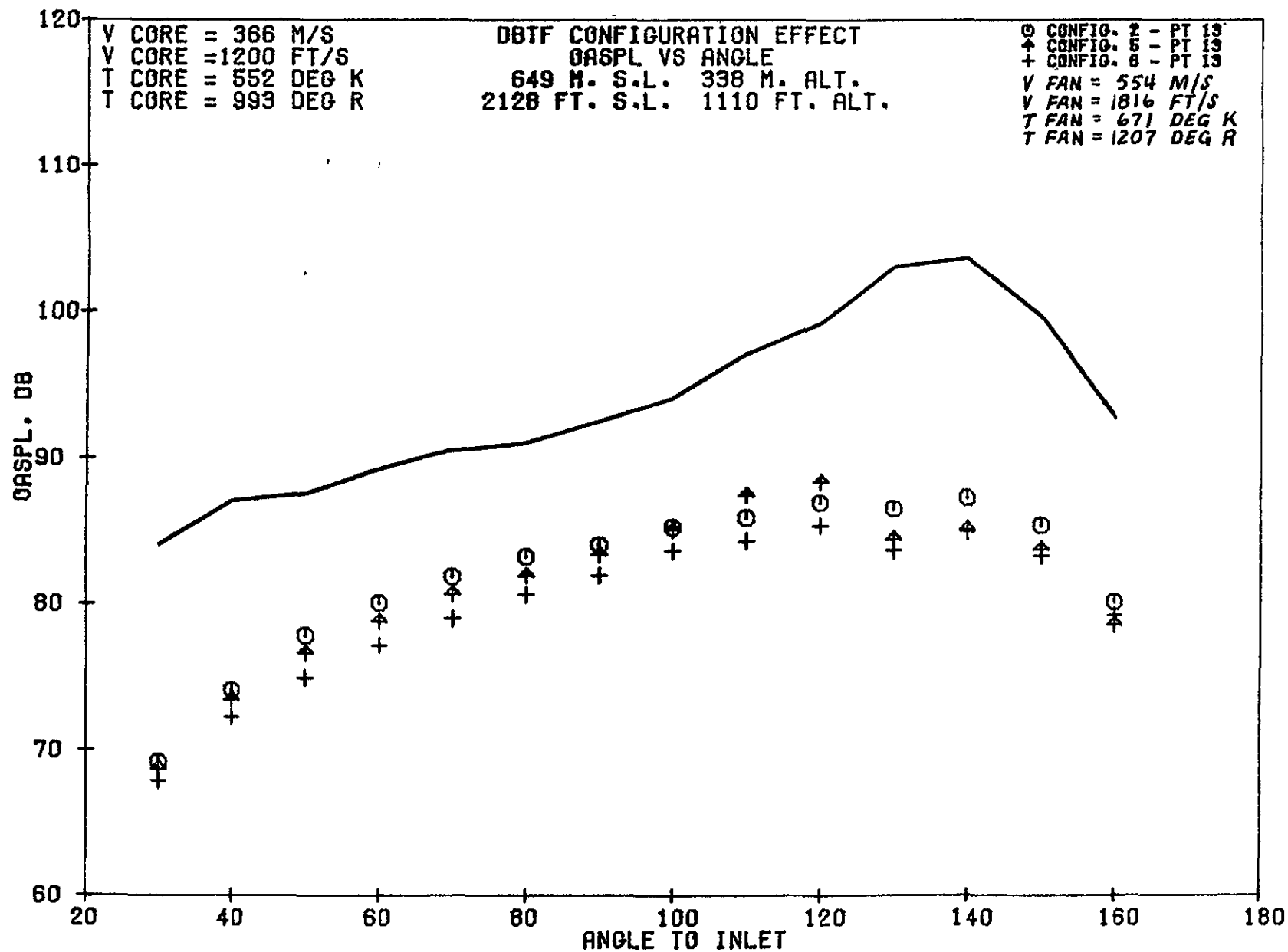


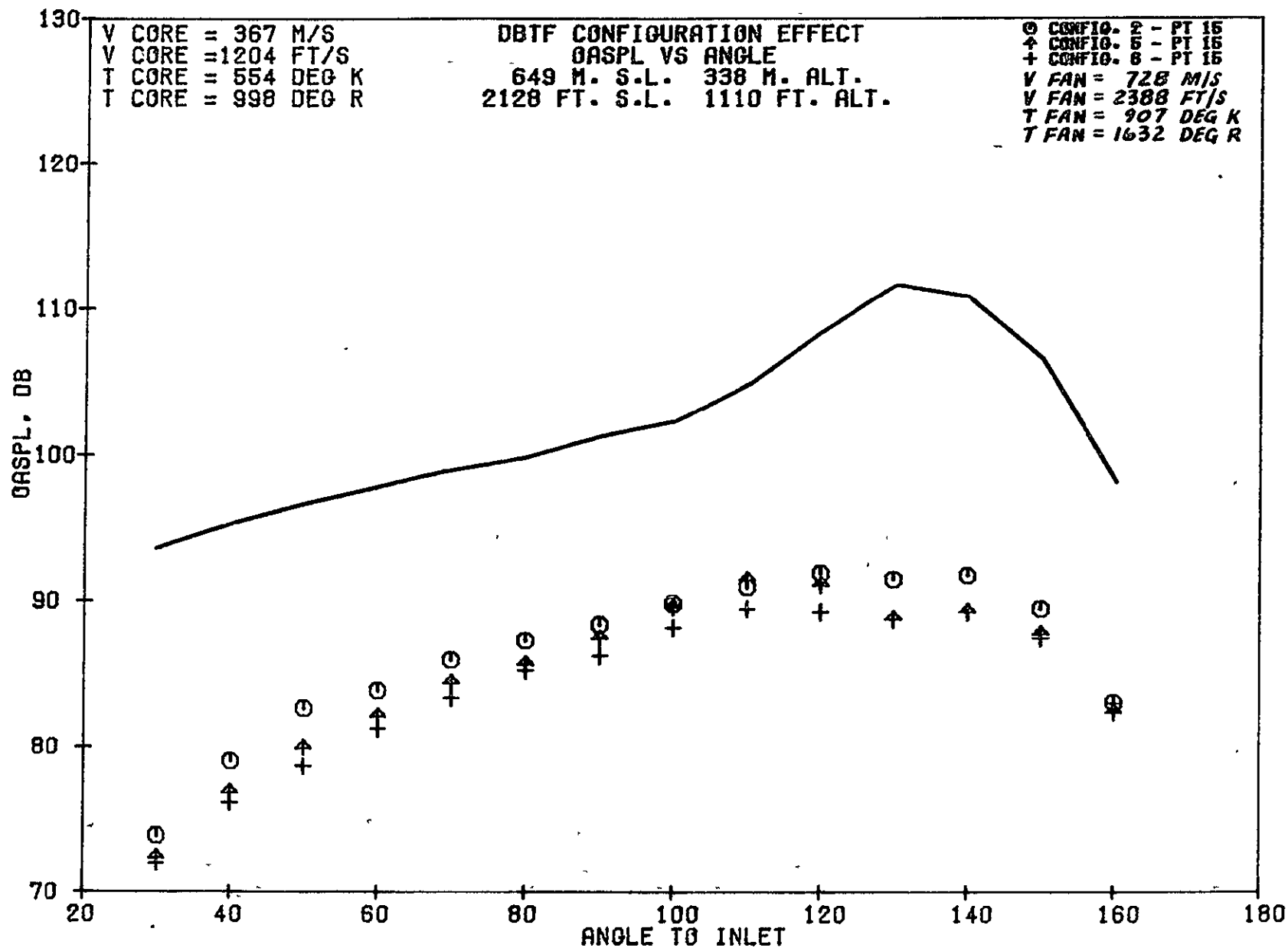

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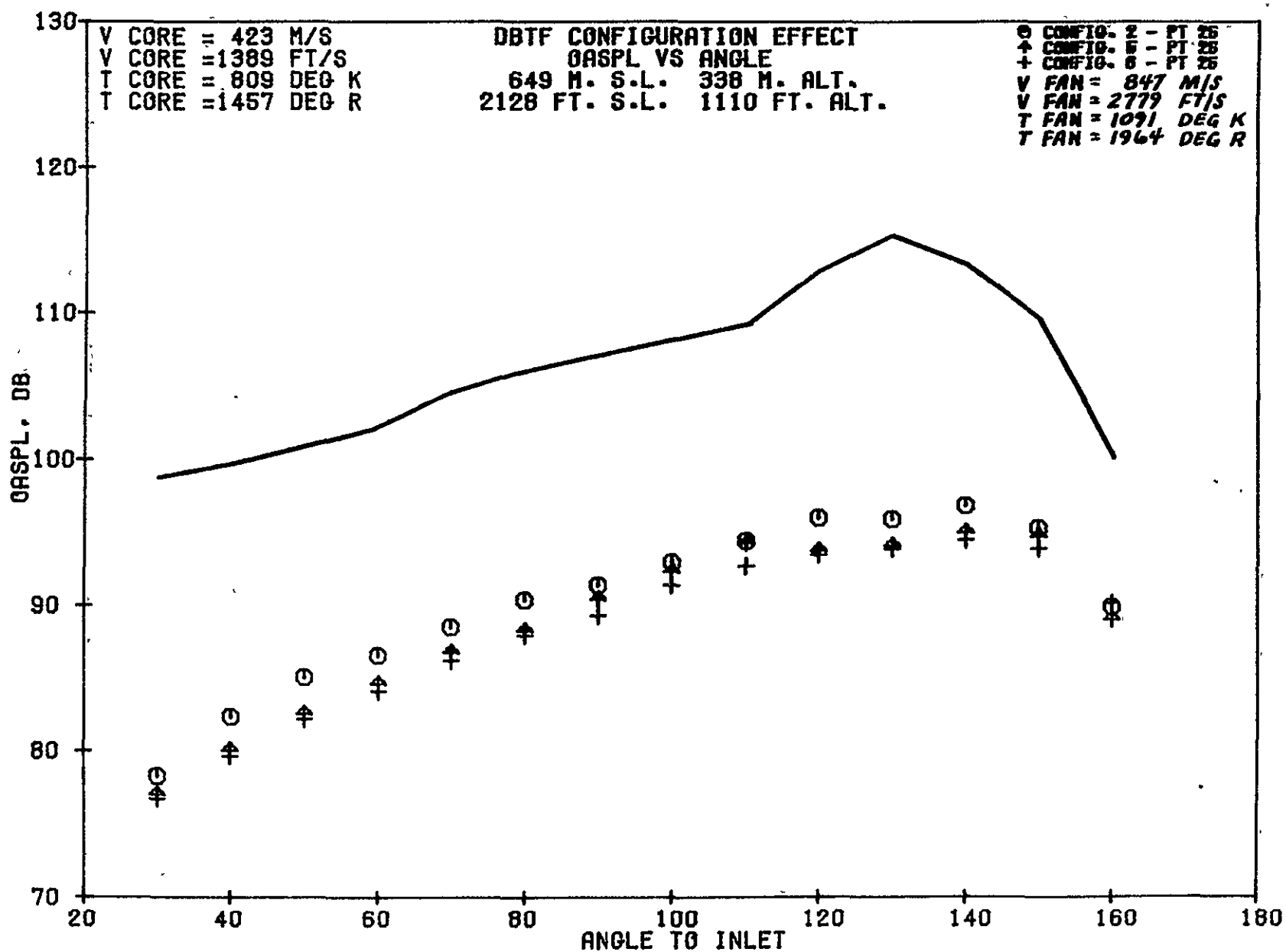




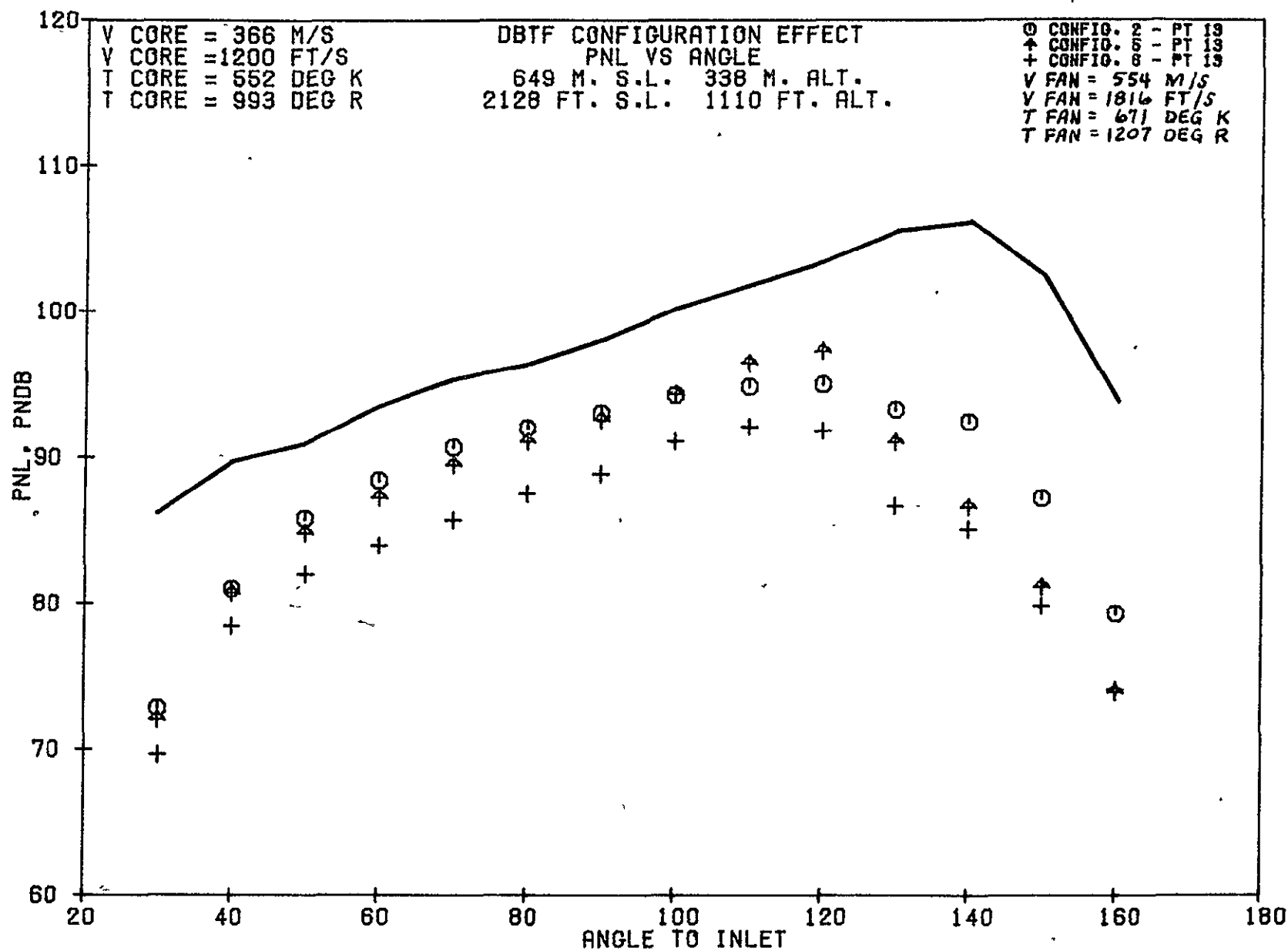
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130

V CORE = 367 M/S
 V CORE = 1204 FT/S
 T CORE = 554 DEG K
 T CORE = 998 DEG R

DBTF CONFIGURATION EFFECT

PNL VS ANGLE
 649 M. S.L. 338 M. ALT.
 2128 FT. S.L. 1110 FT. ALT.

○ CONFIO. 2 - PT 16
 + CONFIO. 5 - PT 16
 + CONFIO. 6 - PT 16
 V FAN = 728 M/S
 V FAN = 2388 FT/S
 T FAN = 907 DEG K
 T FAN = 1632 DEG R

120

110

100

90

80

70

PNL: PNDB

20

40

60

80

100

120

140

160

180

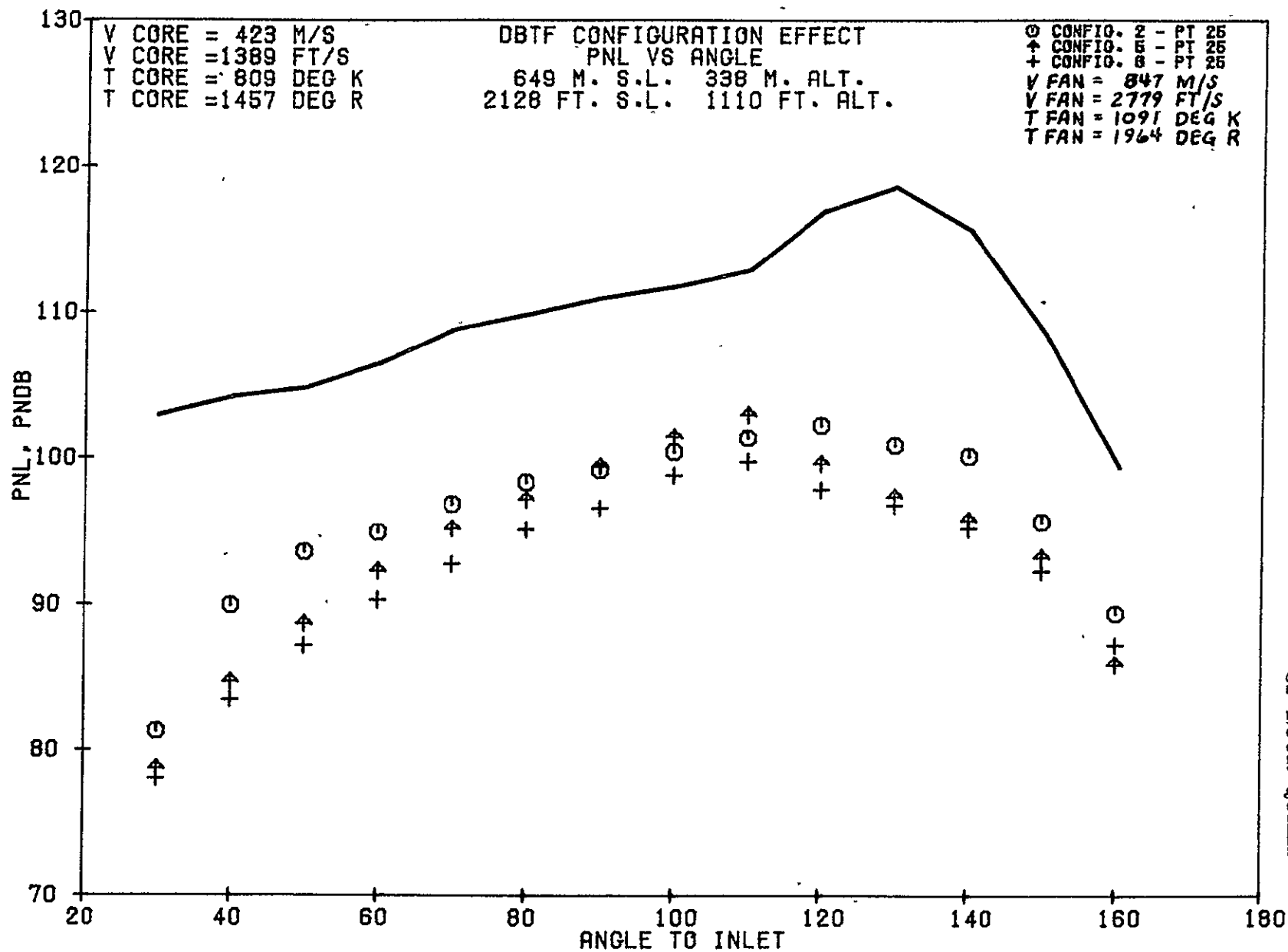
ANGLE TO INLET

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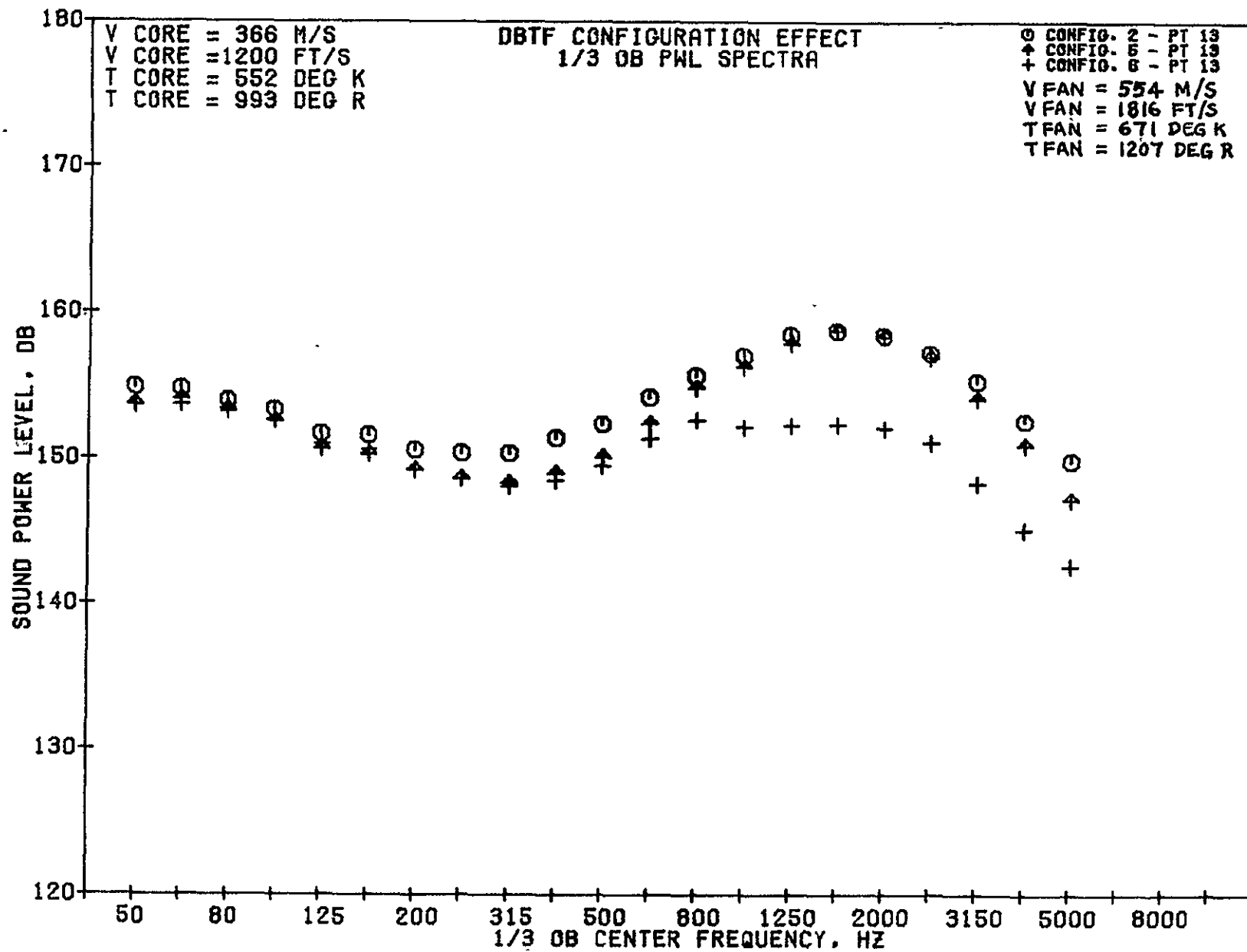
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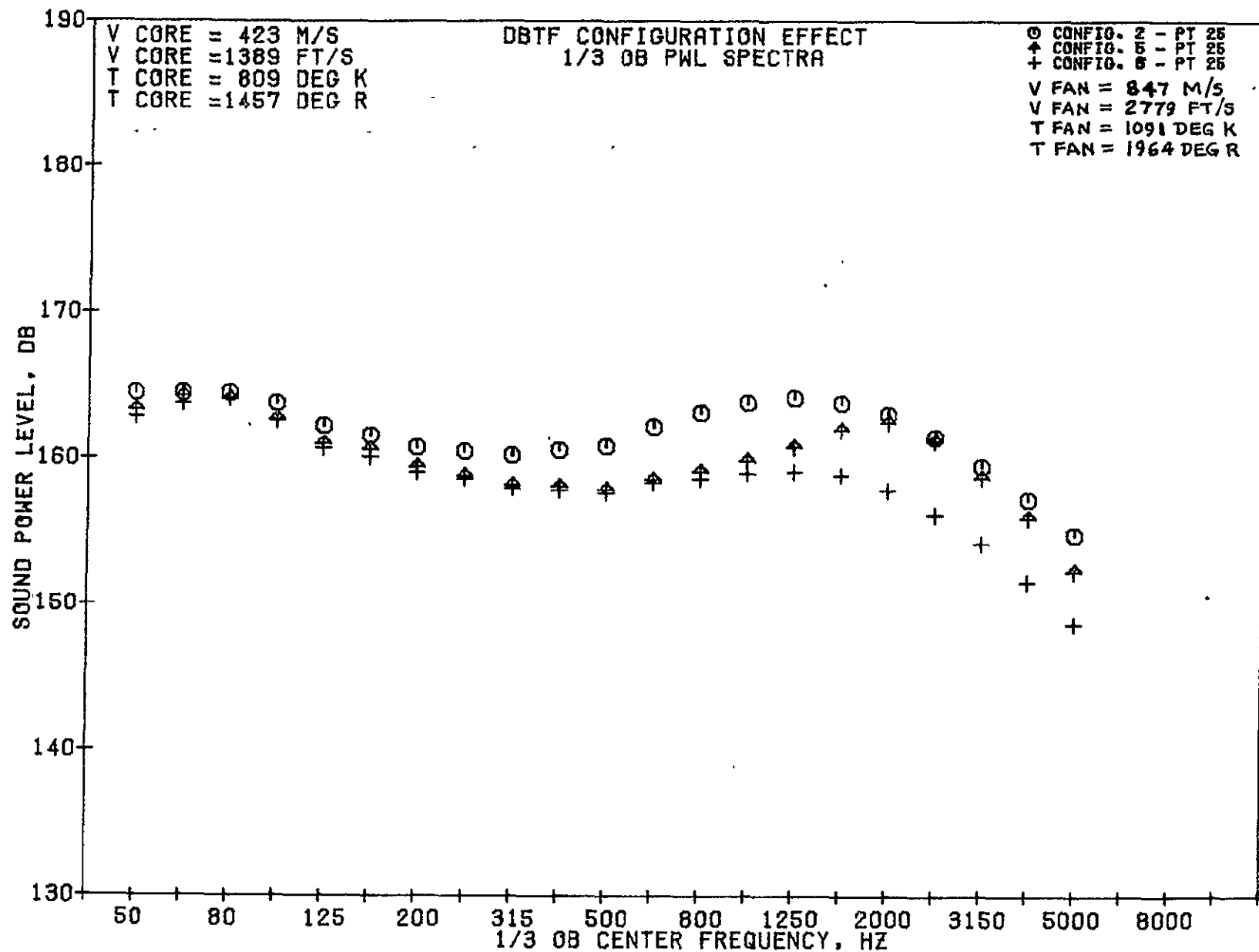
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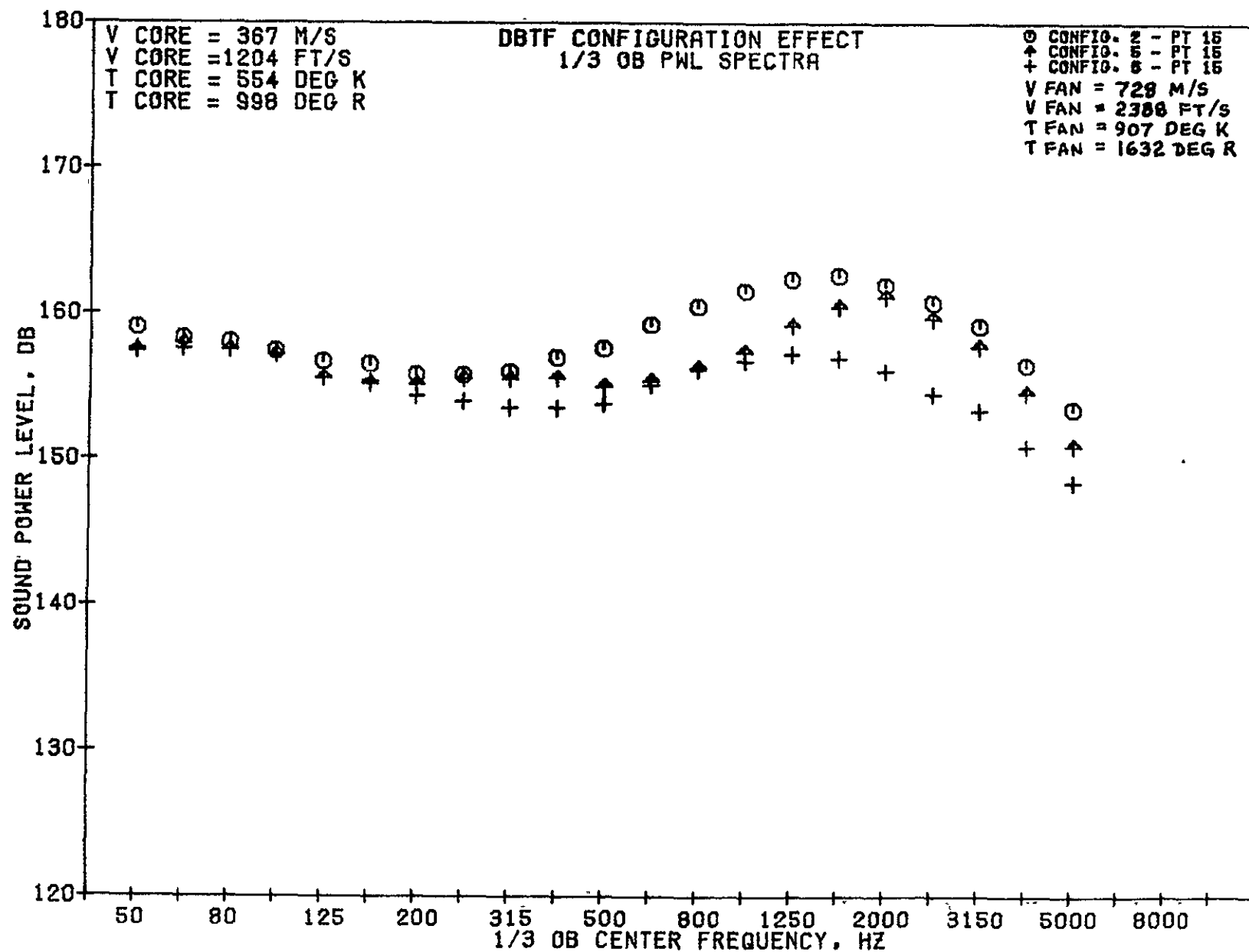
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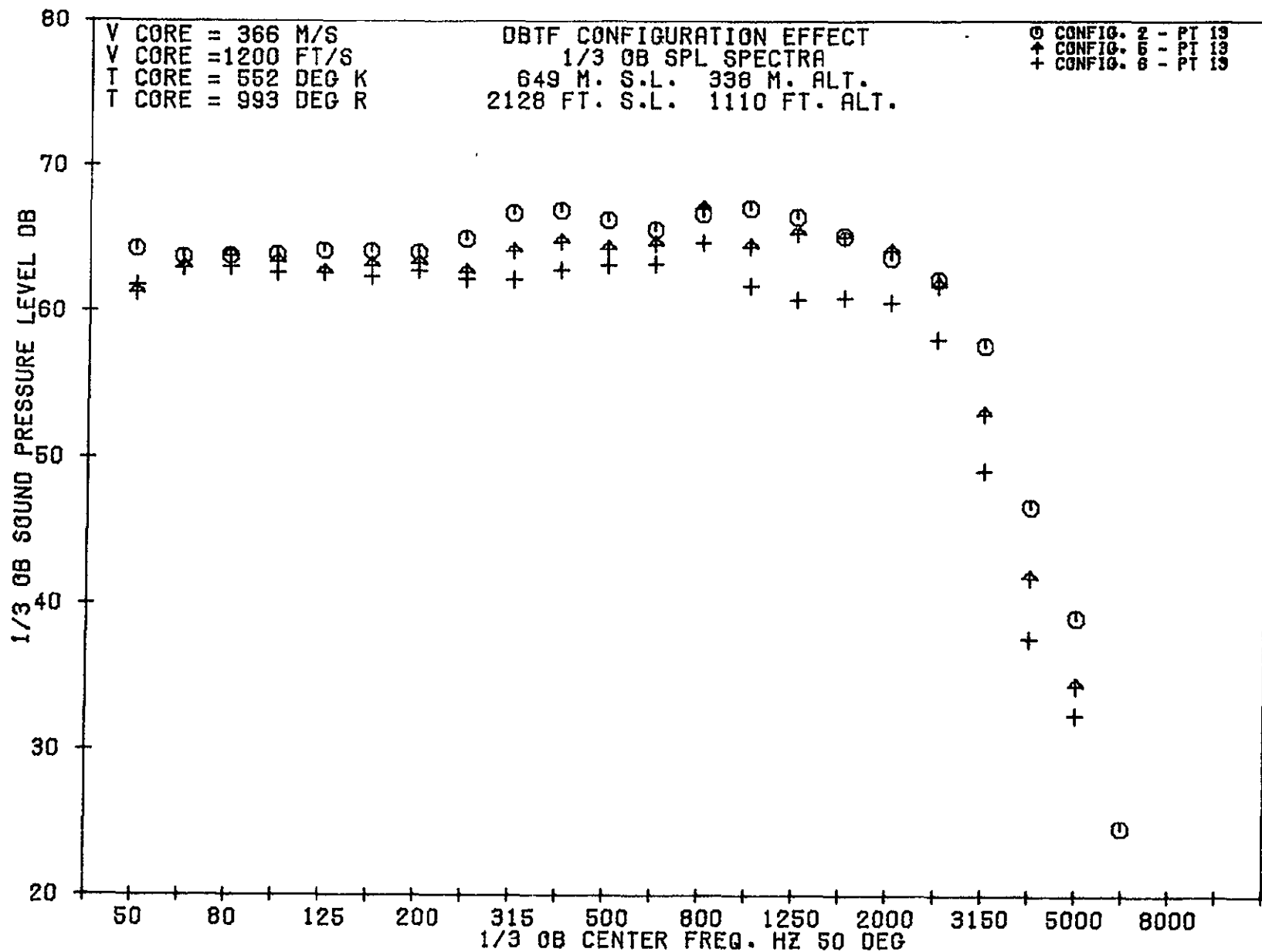
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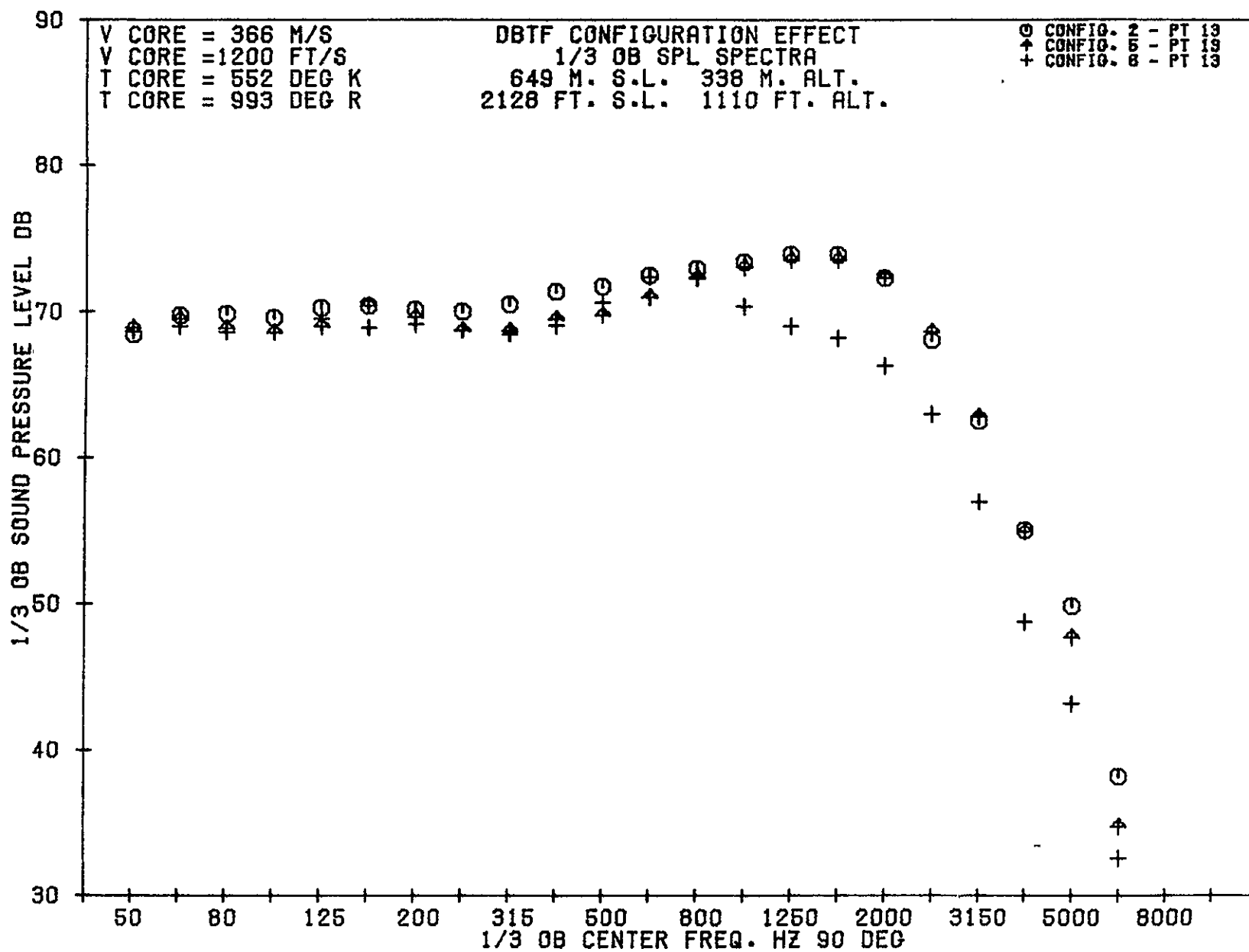


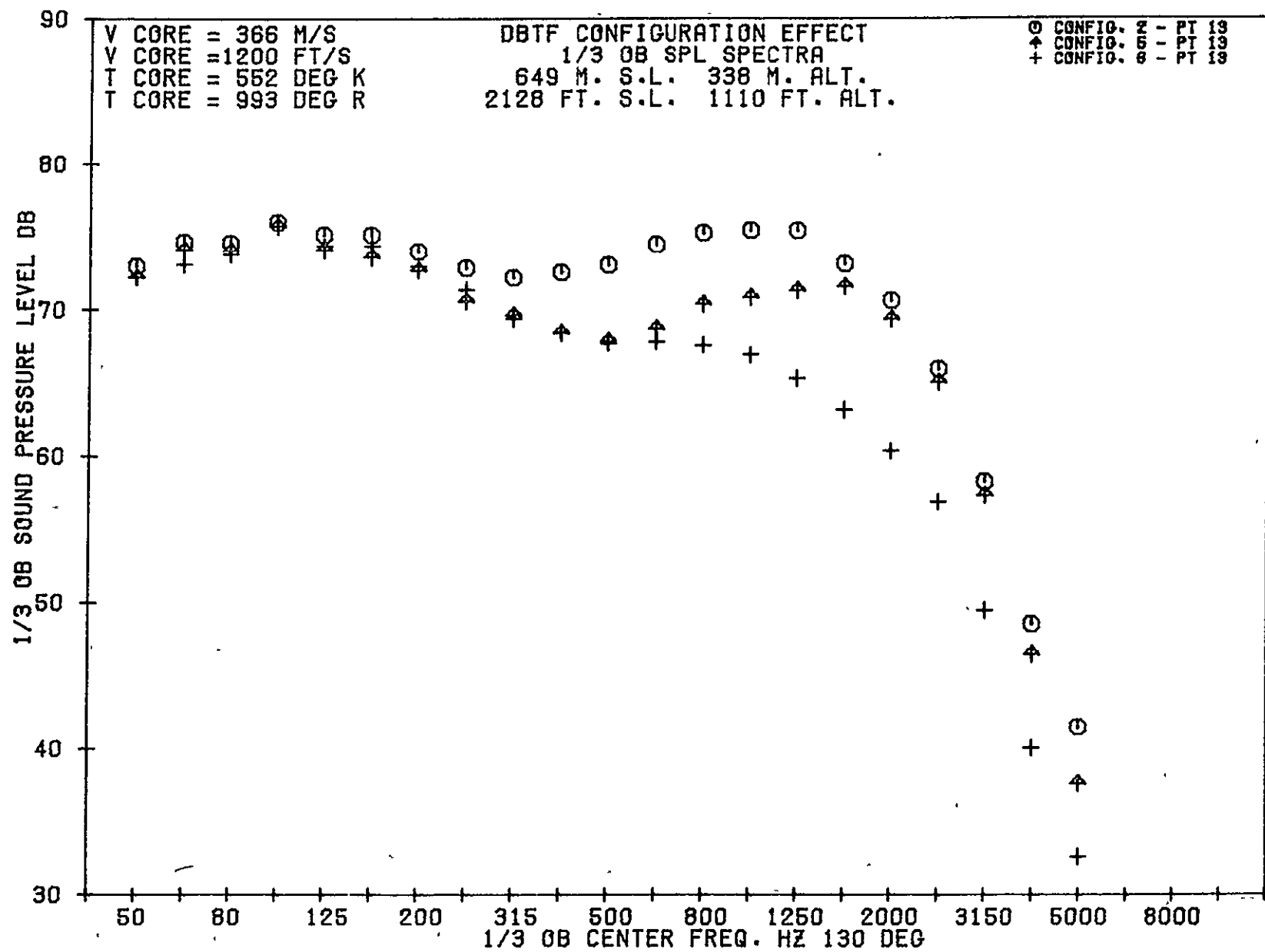
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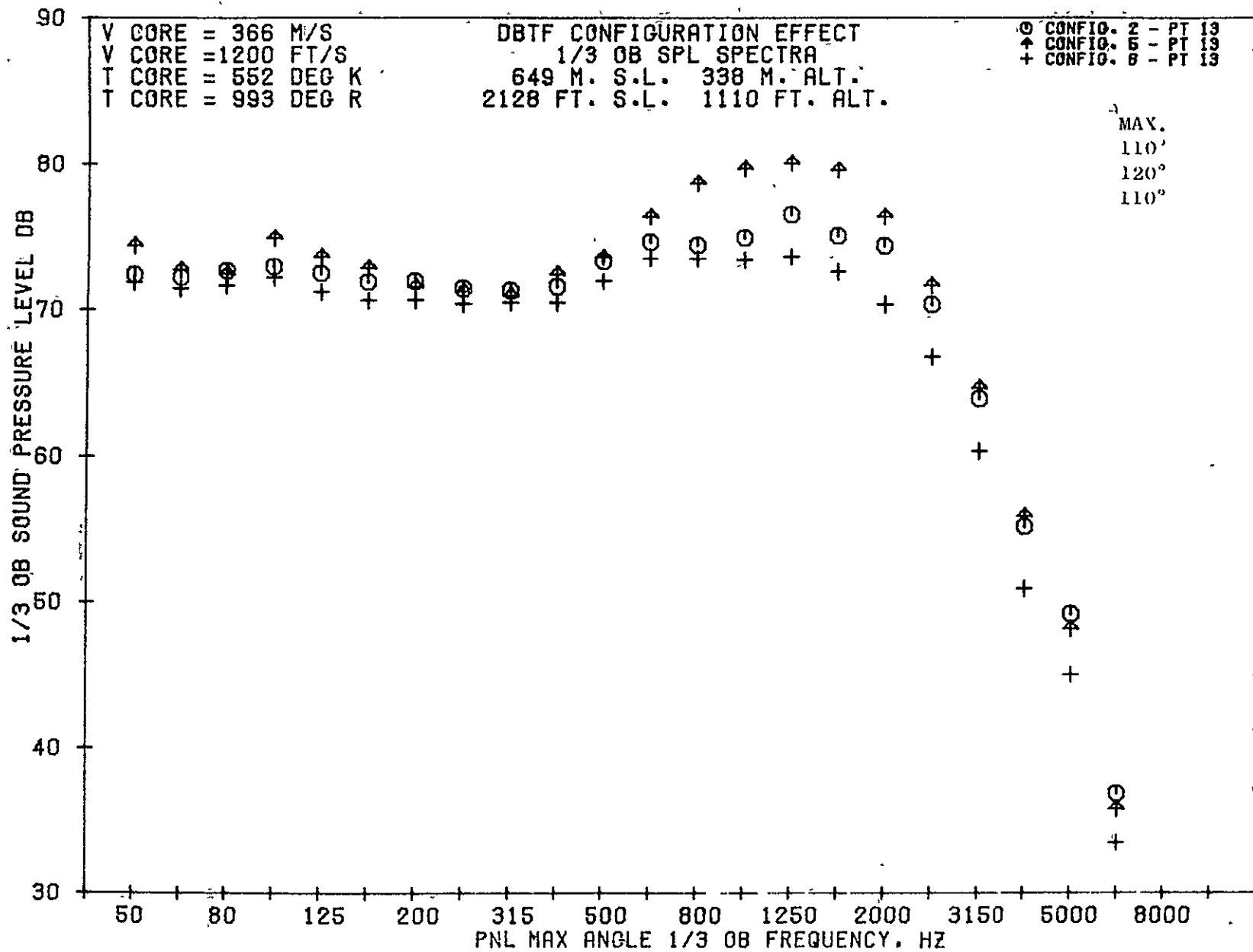
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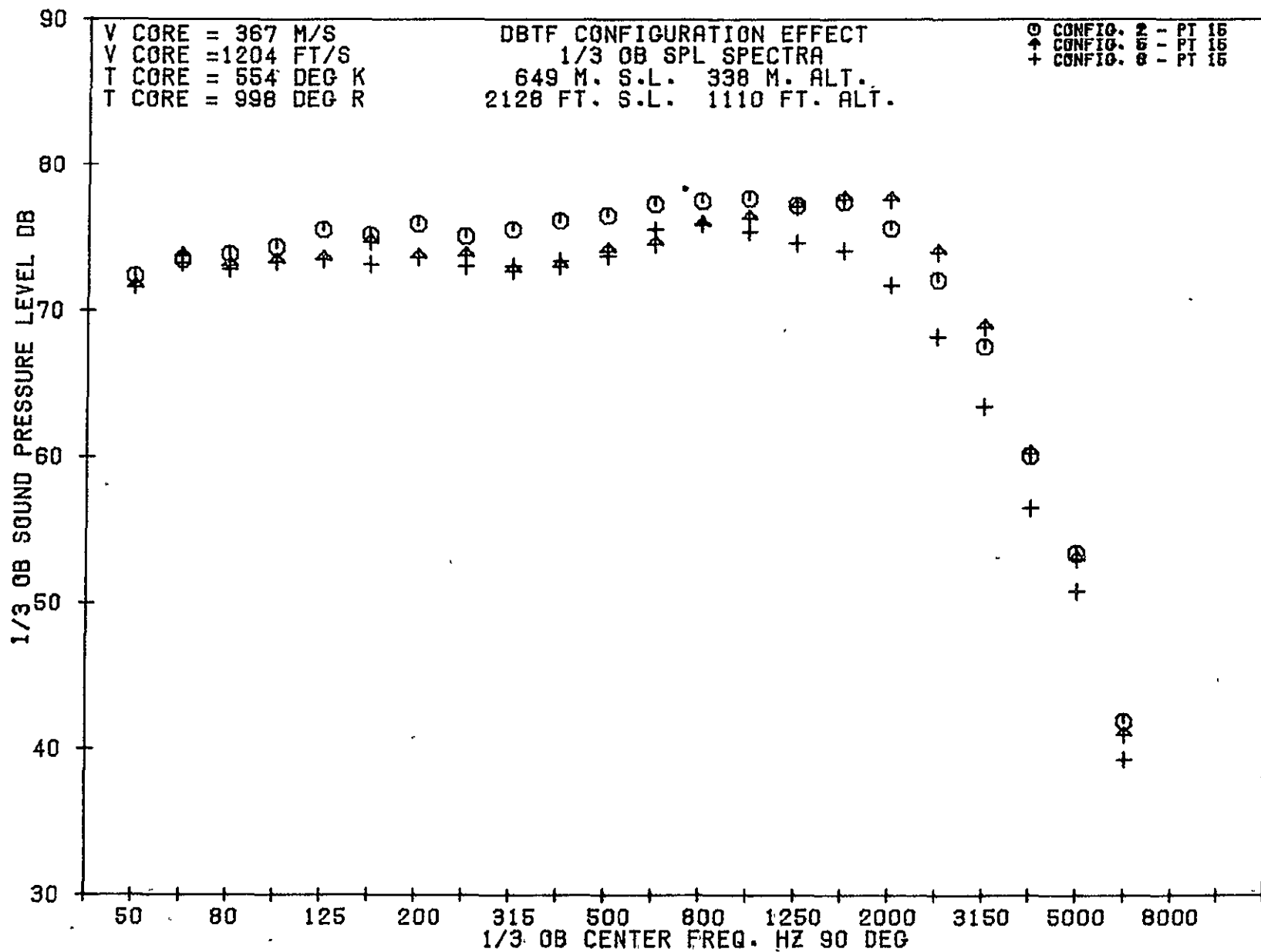


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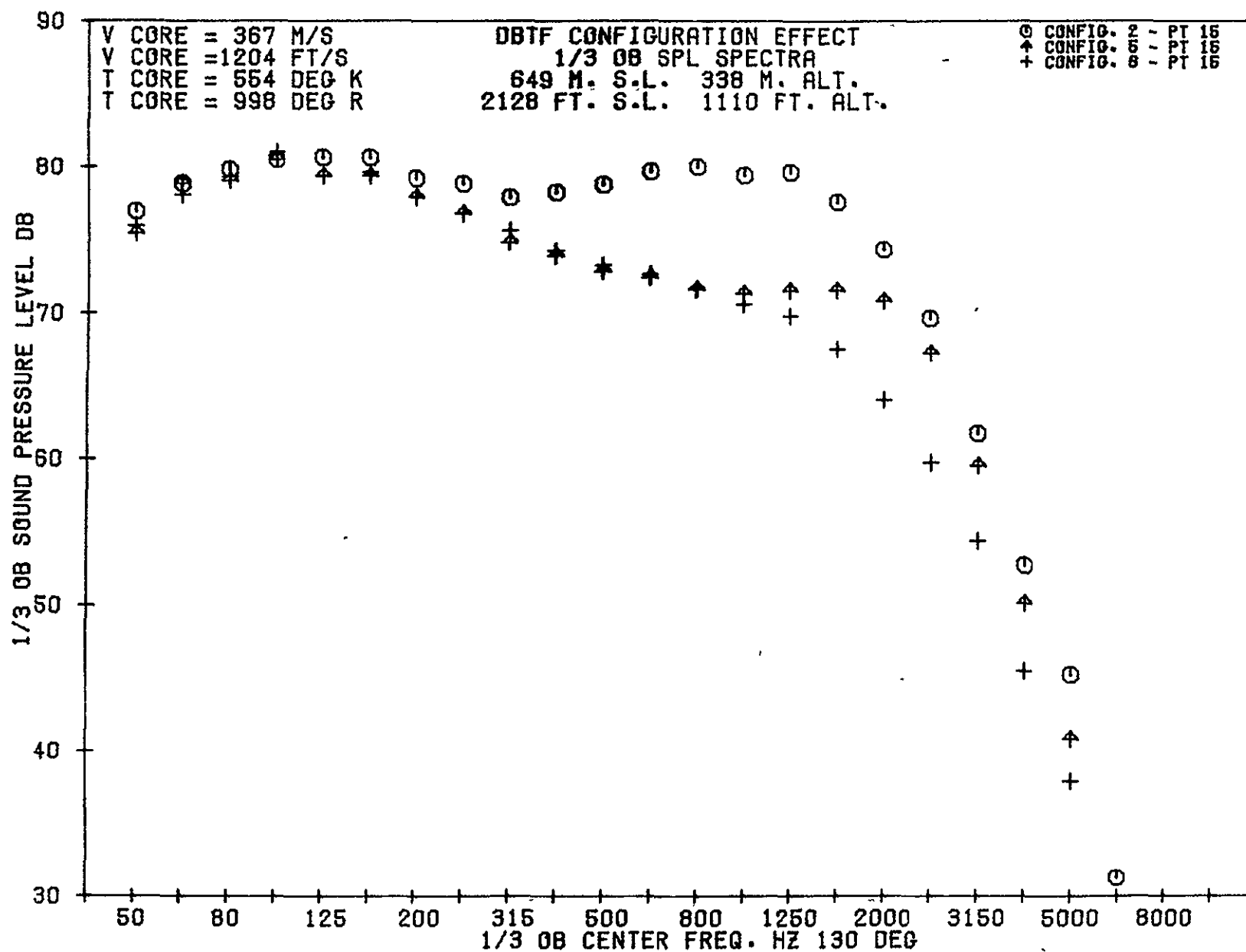
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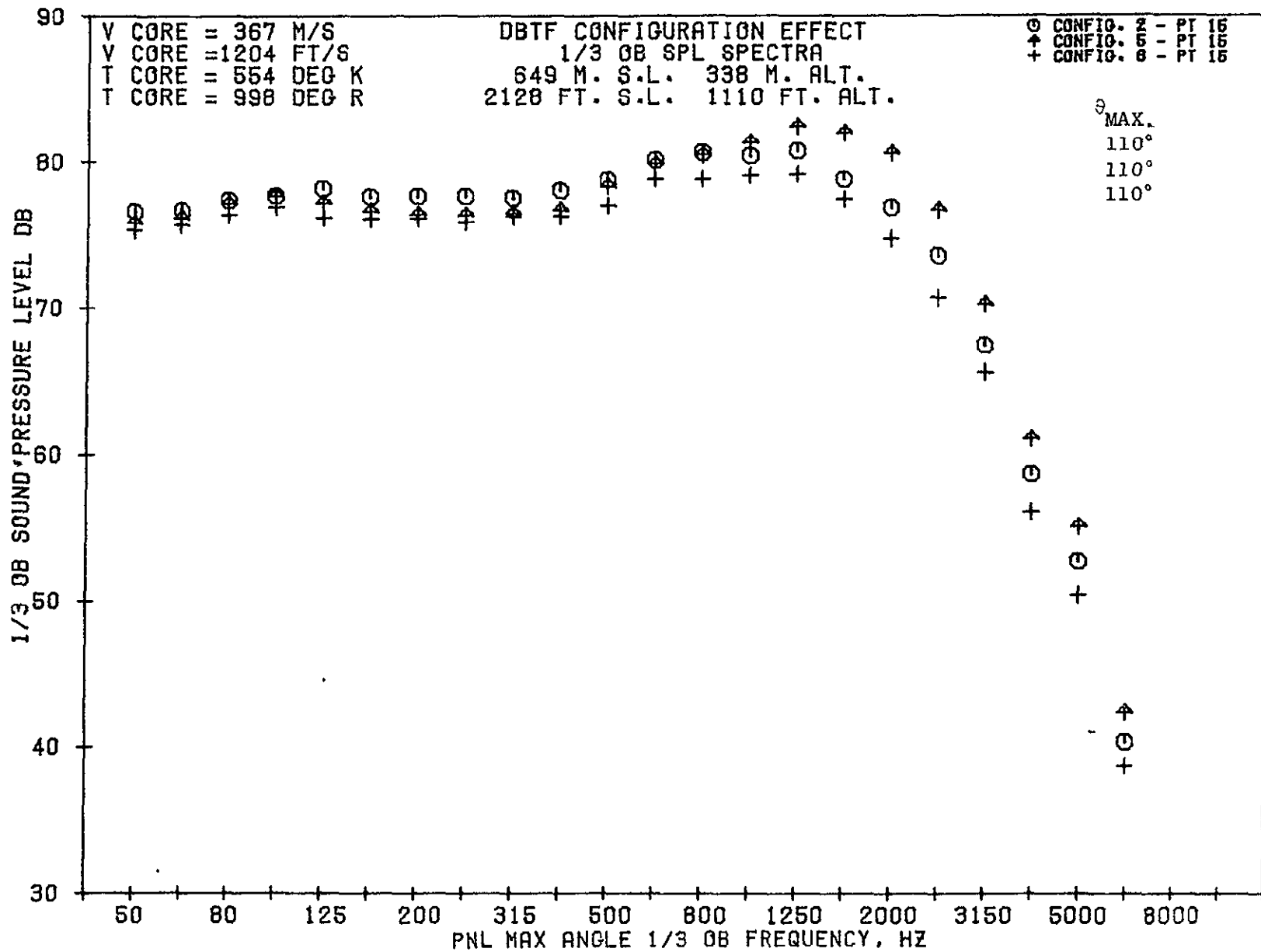


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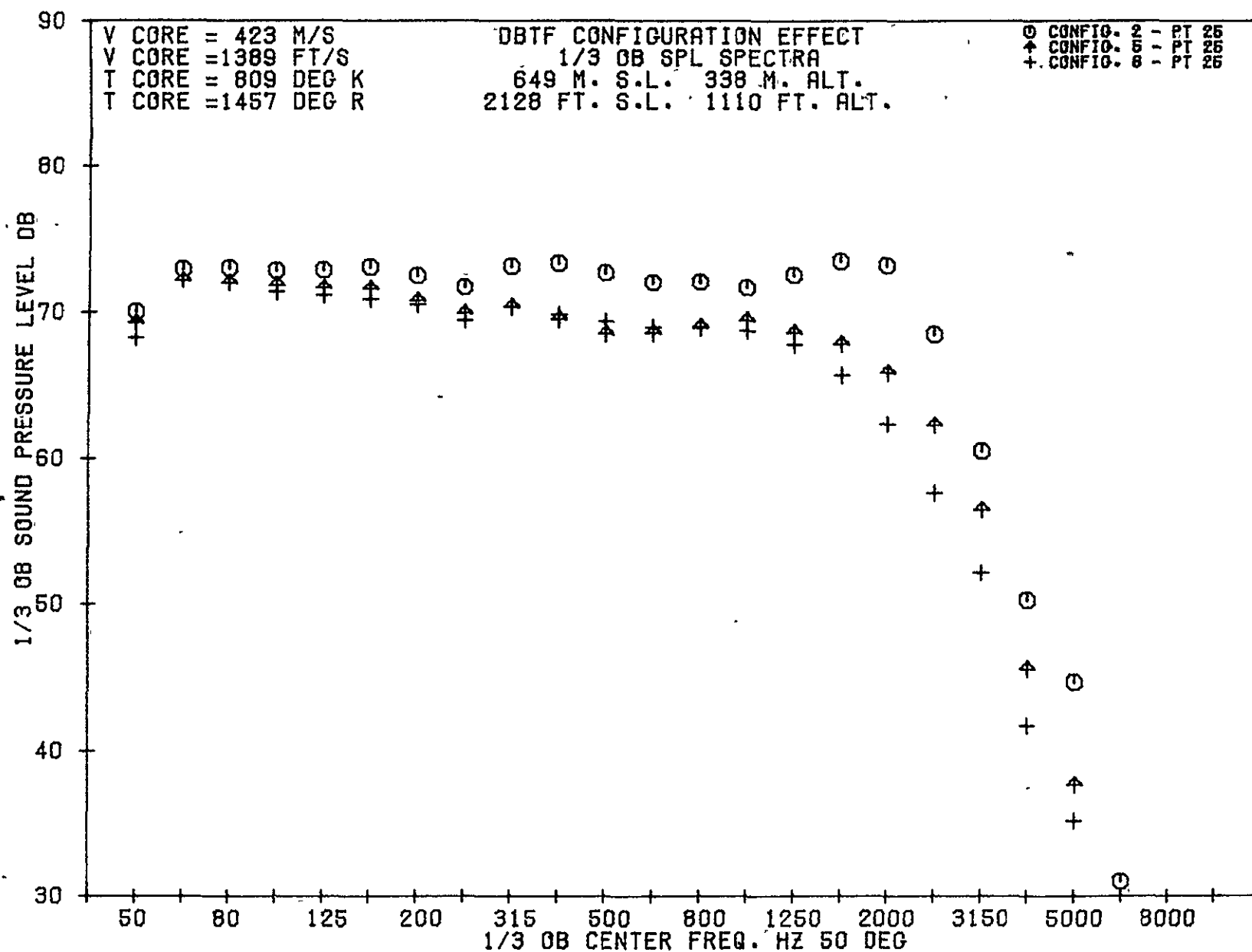


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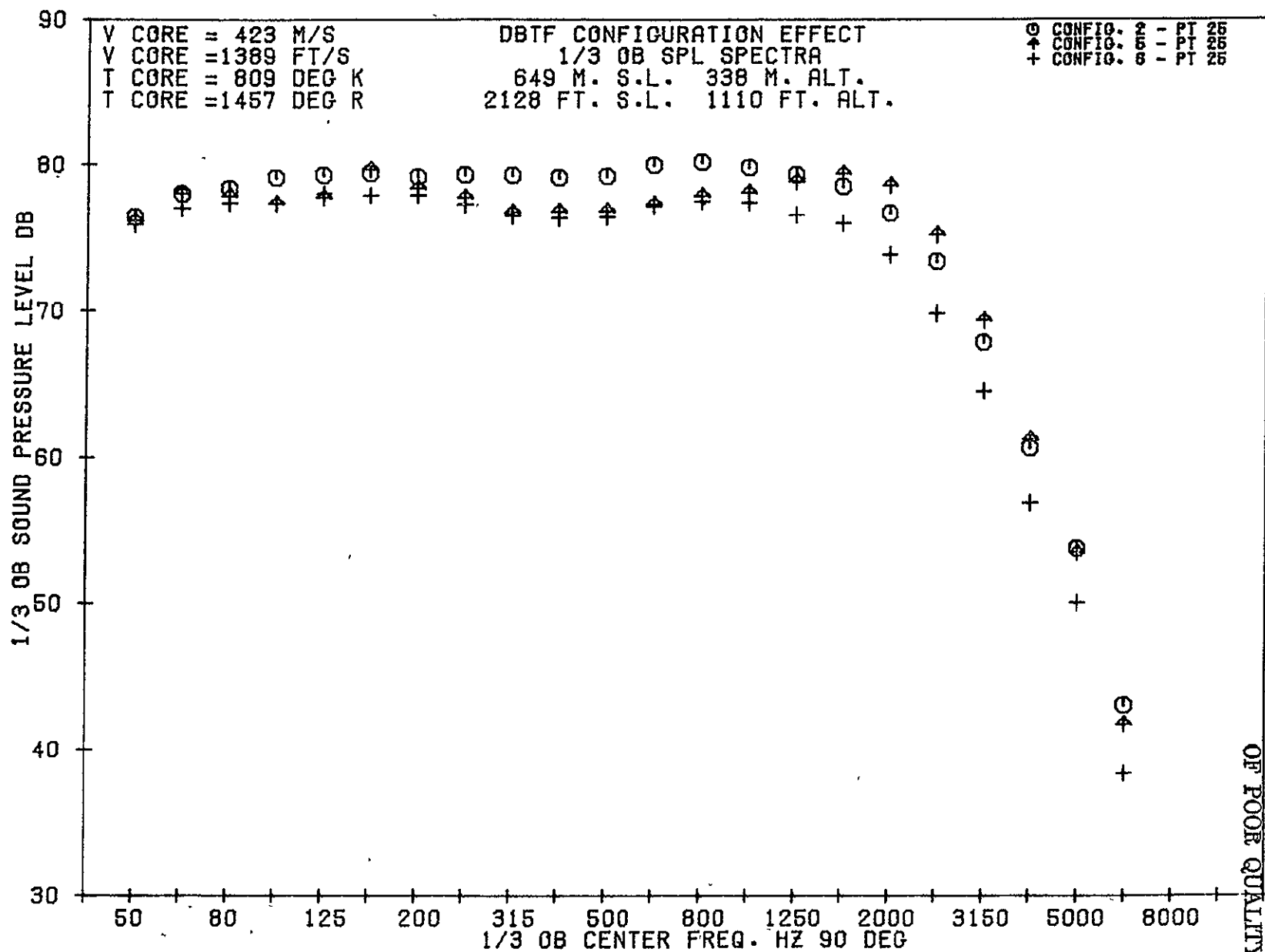




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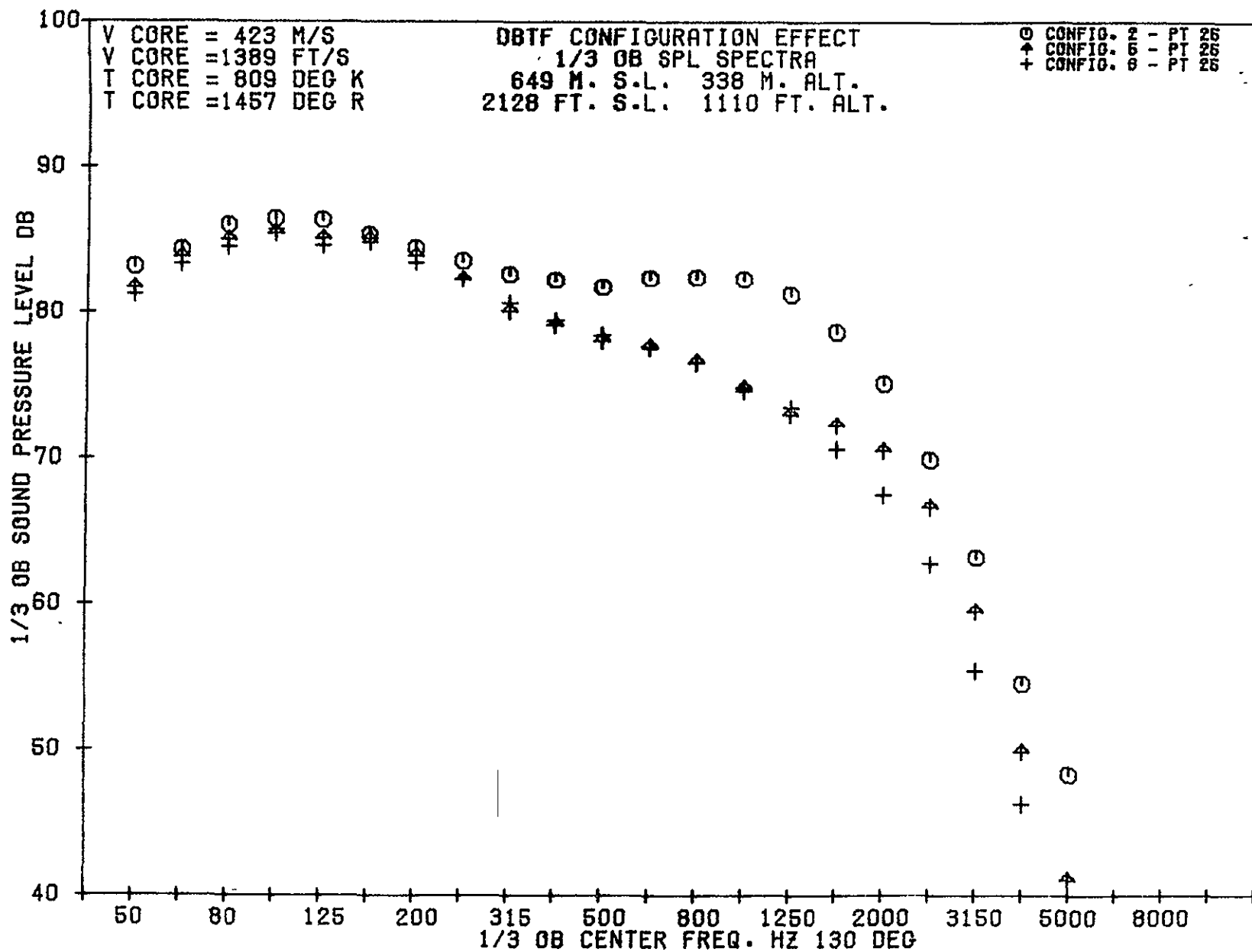
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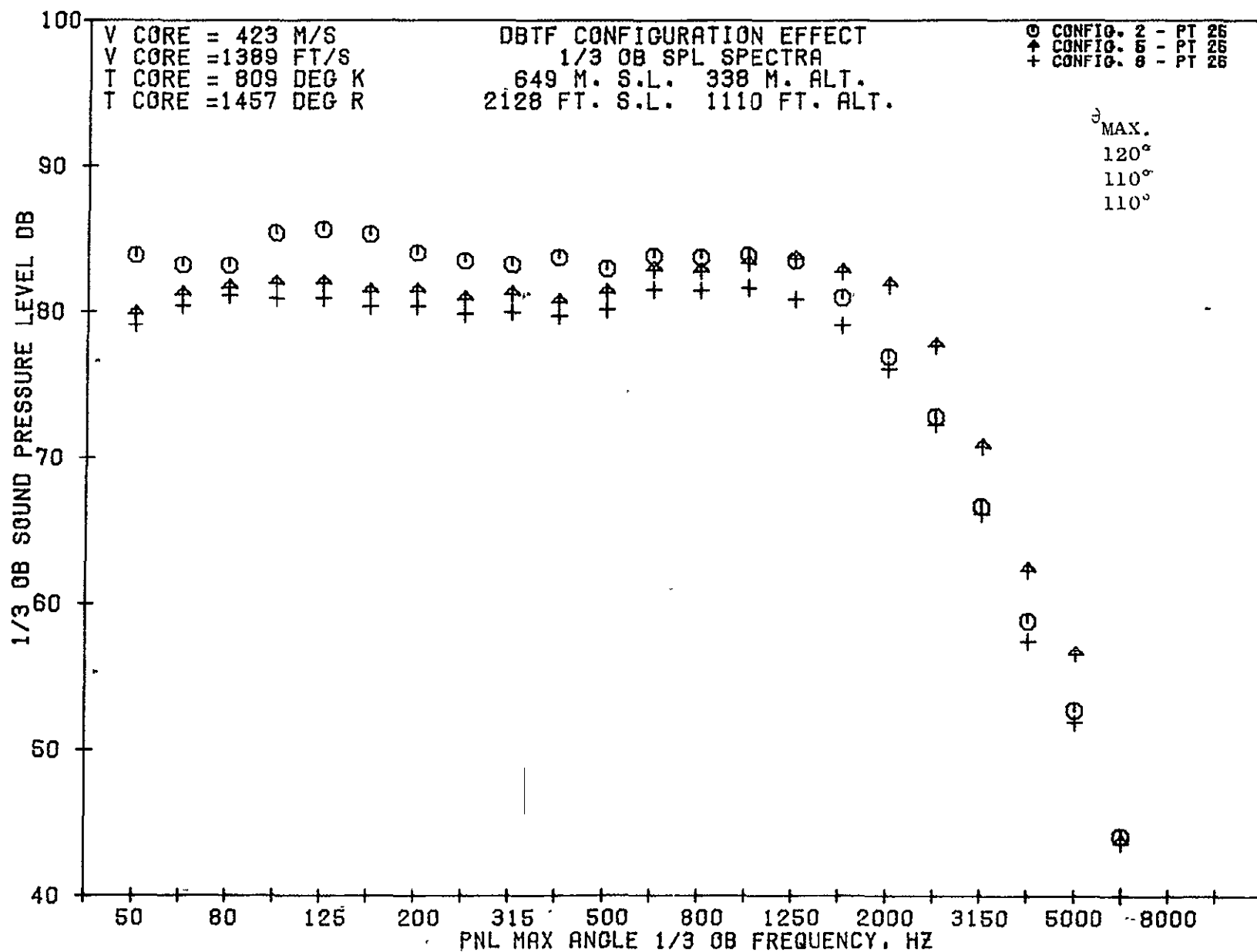
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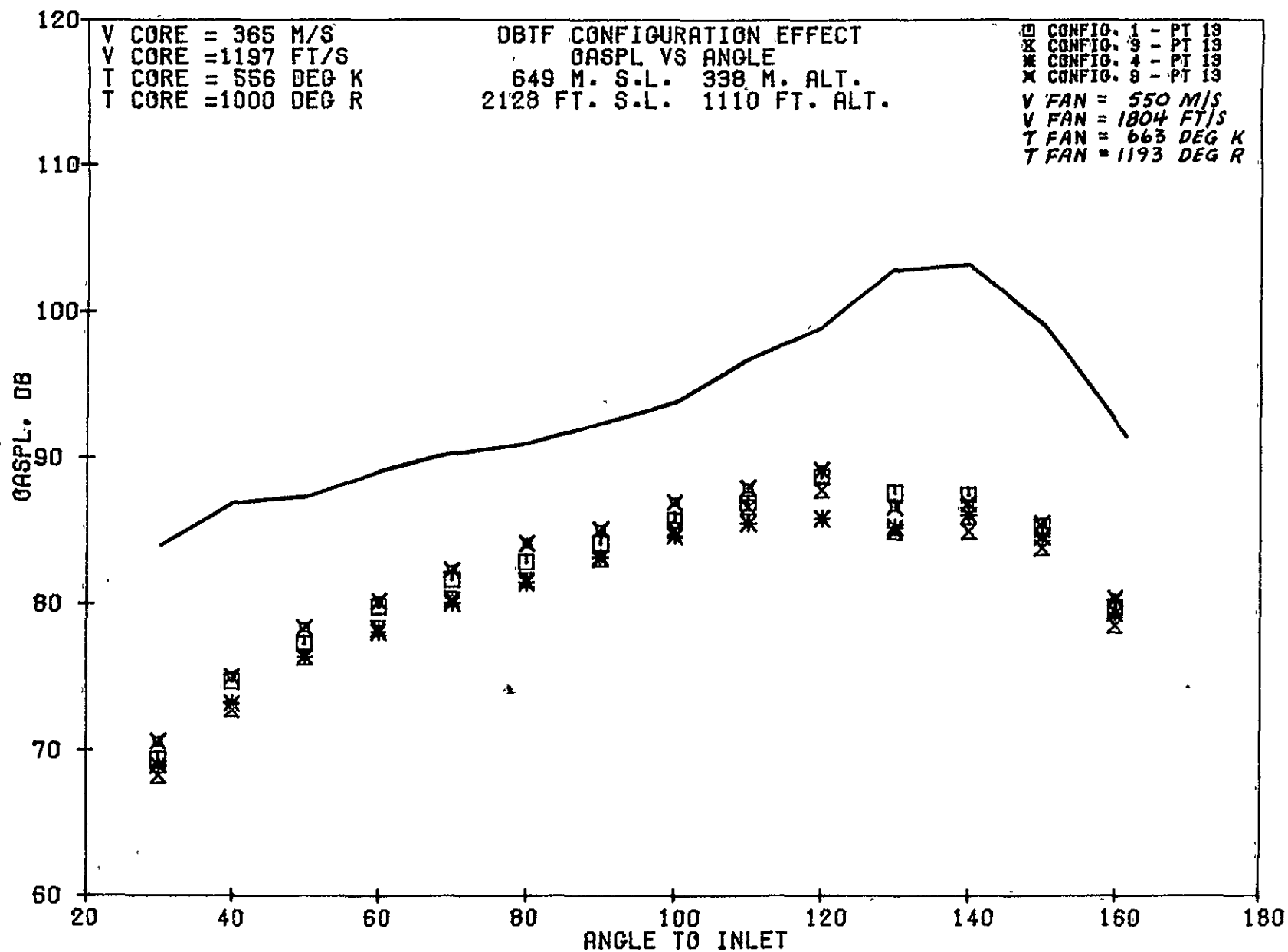


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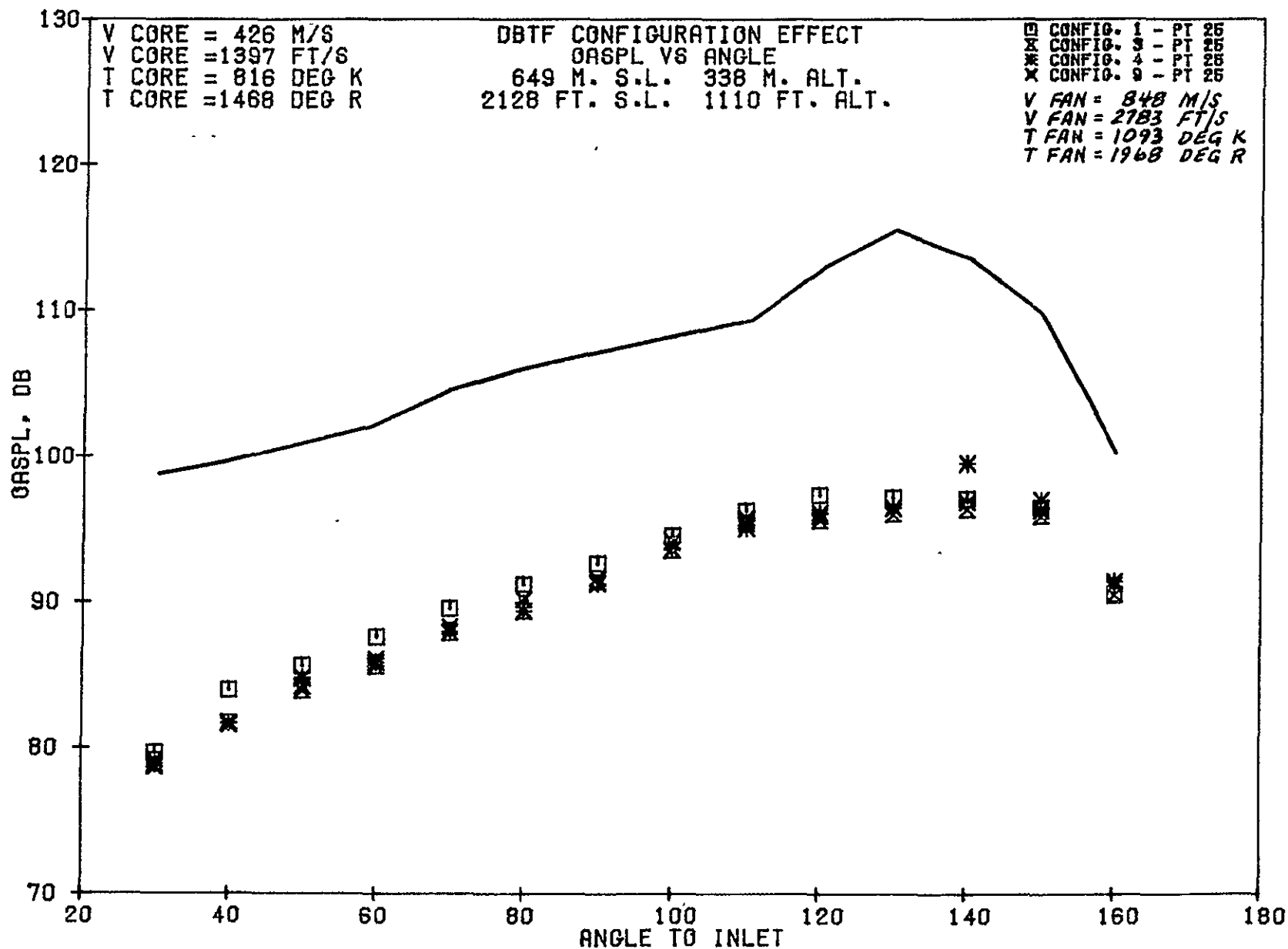


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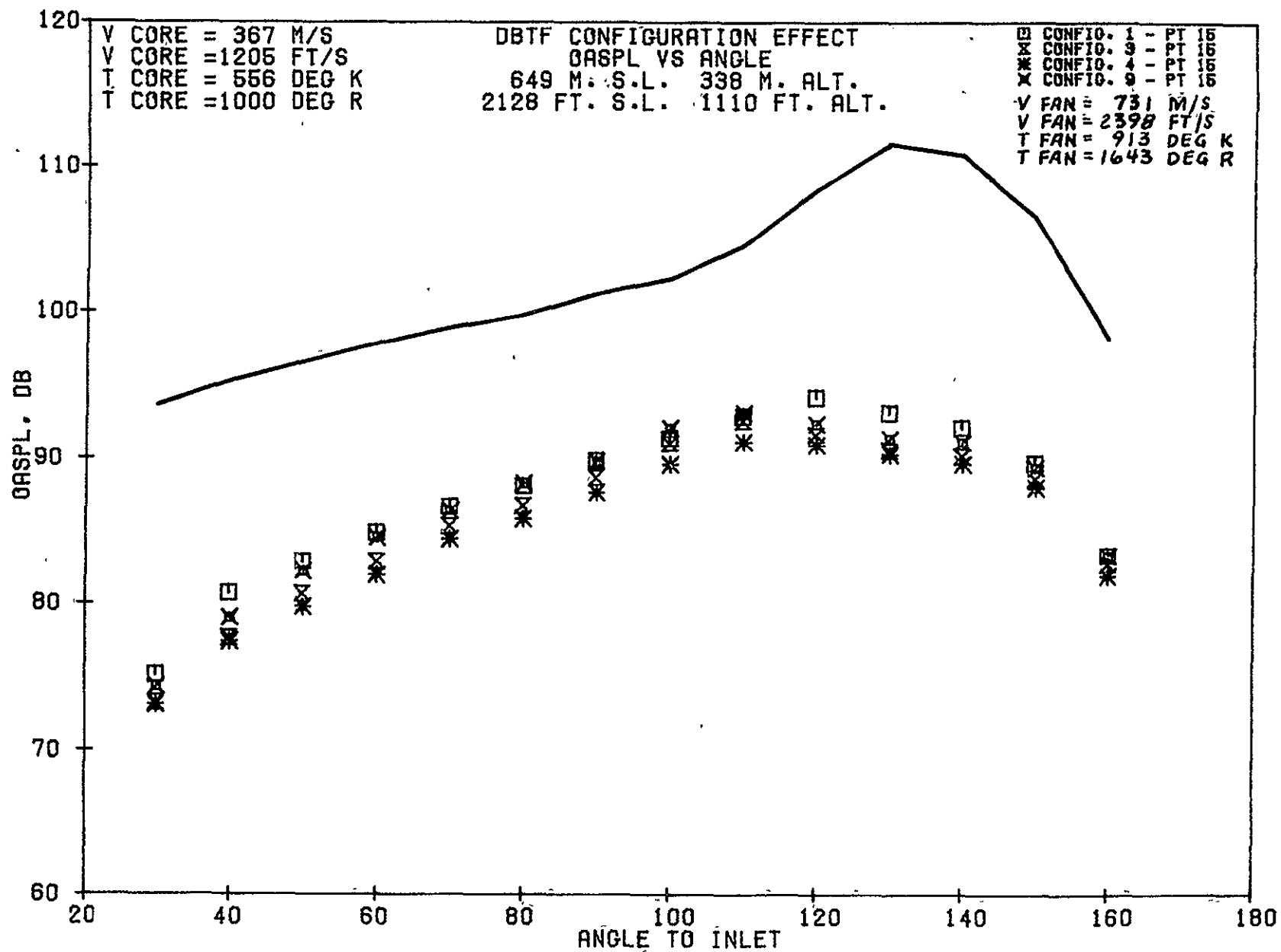
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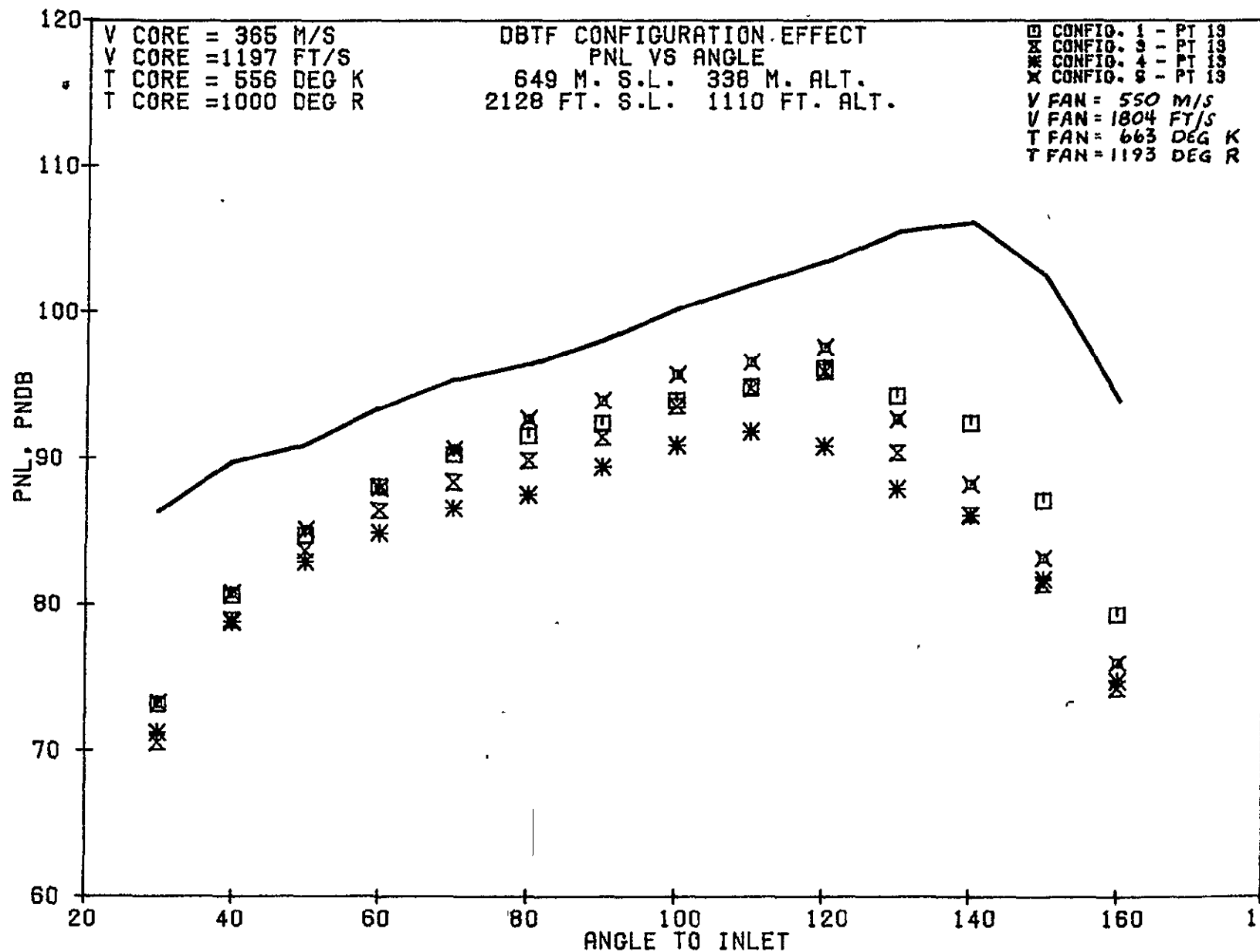


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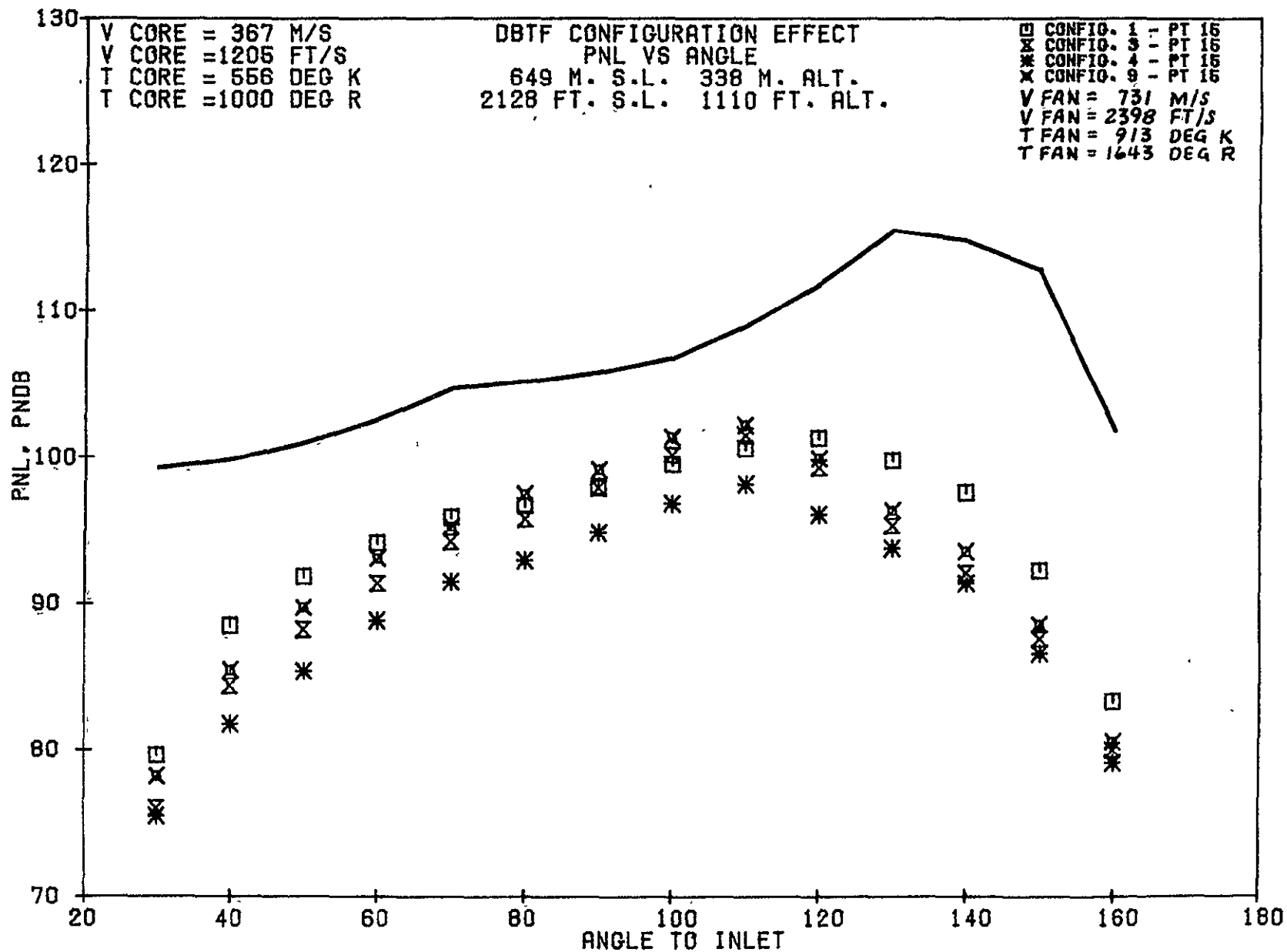
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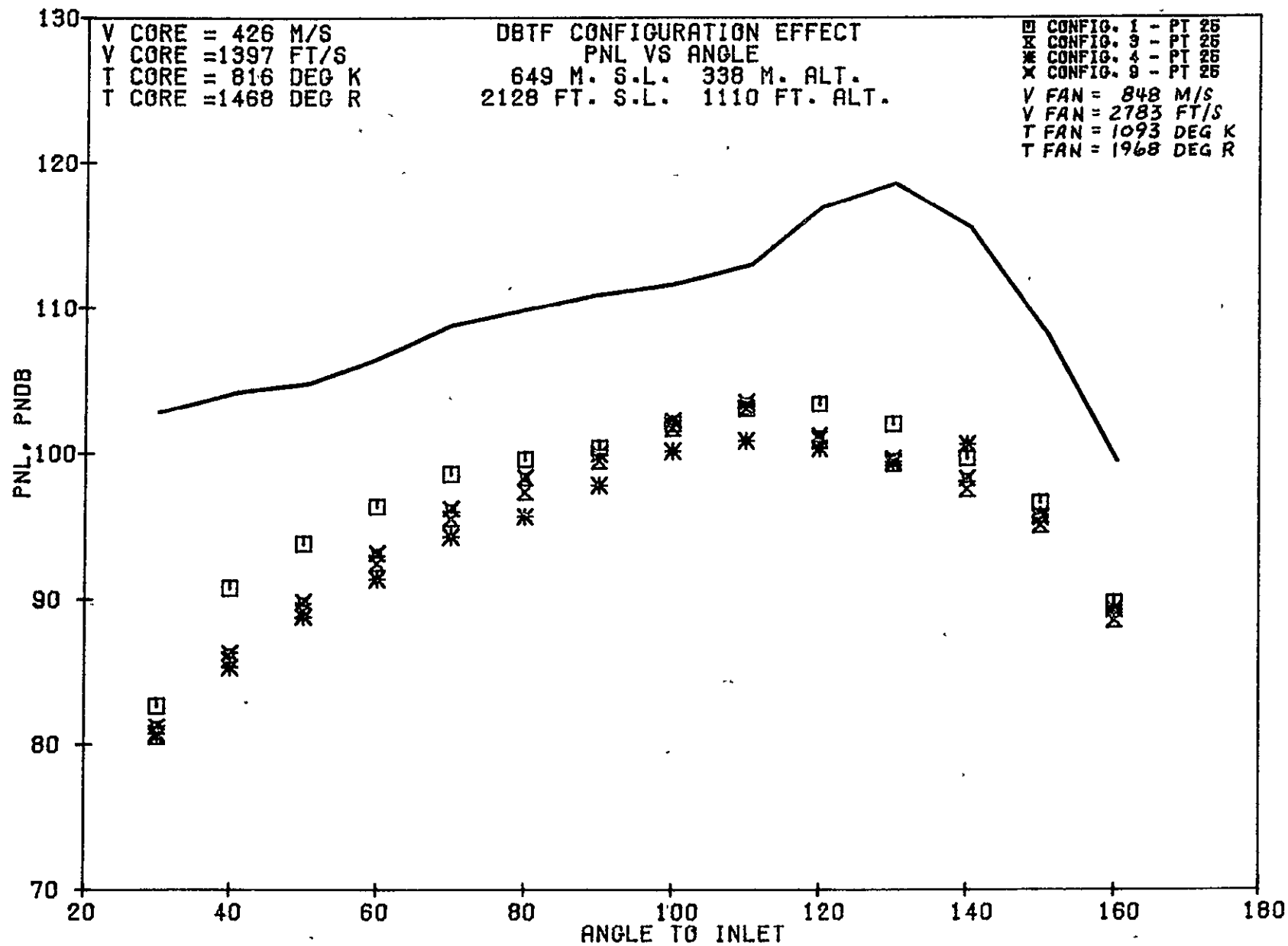
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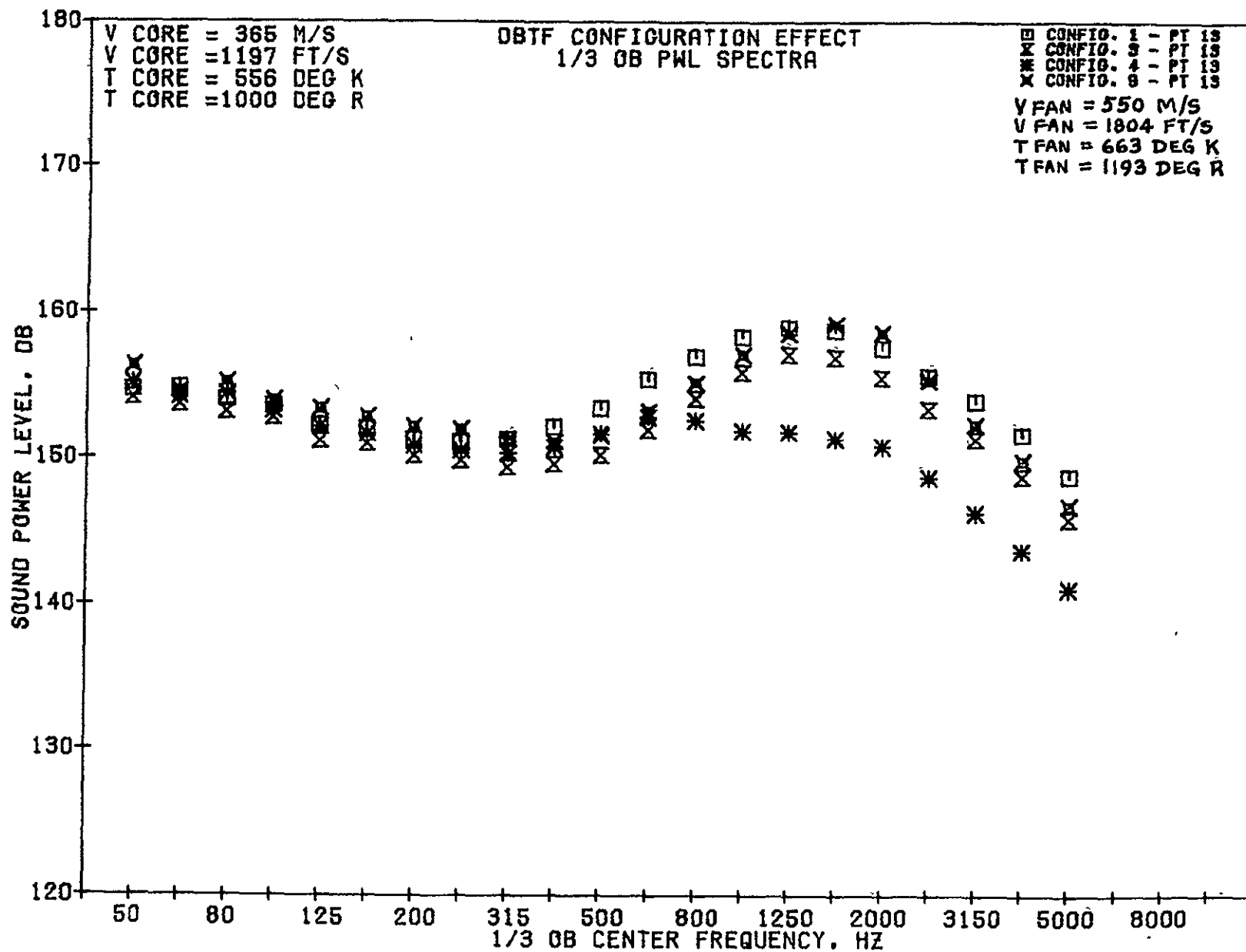


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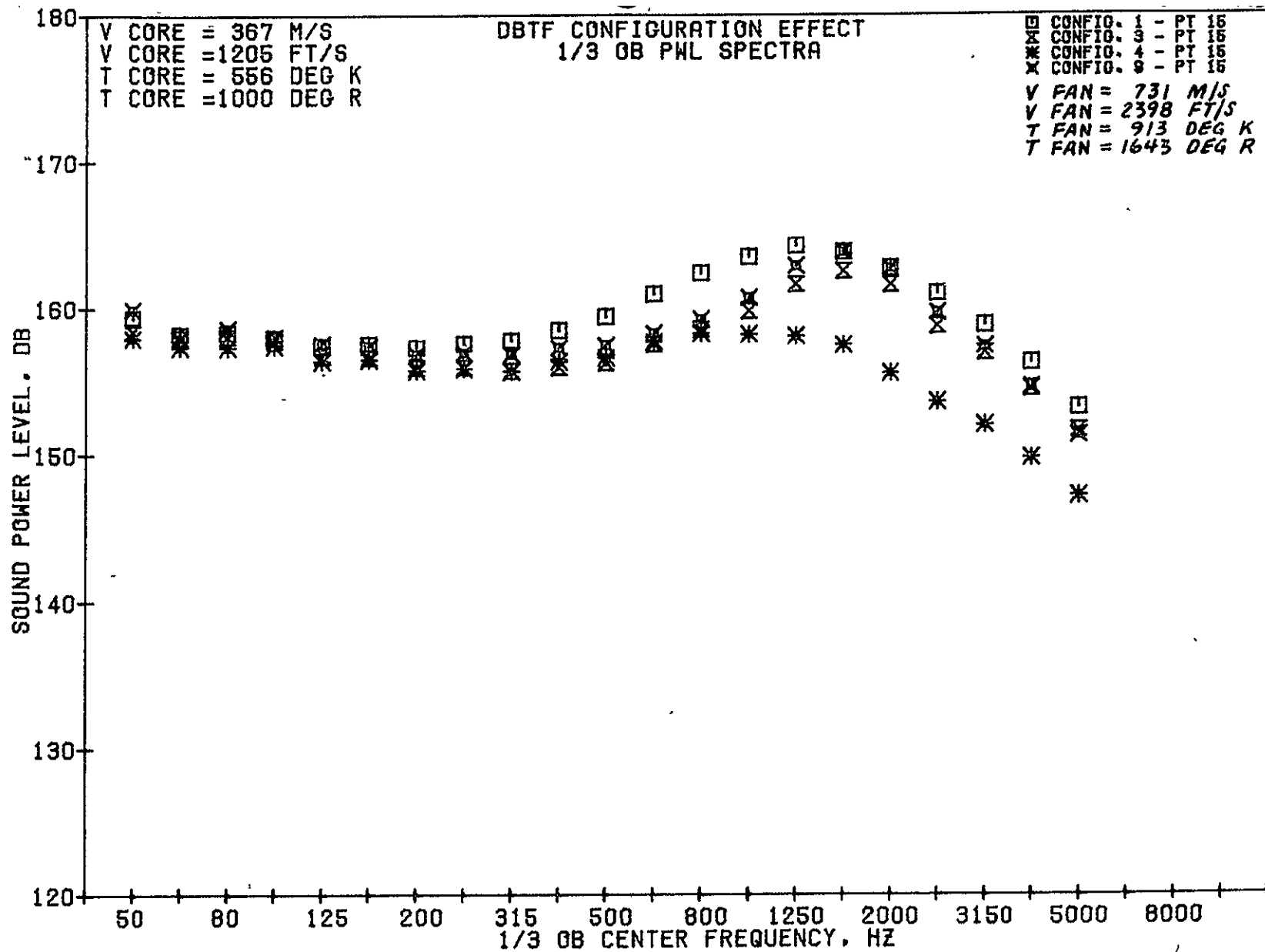


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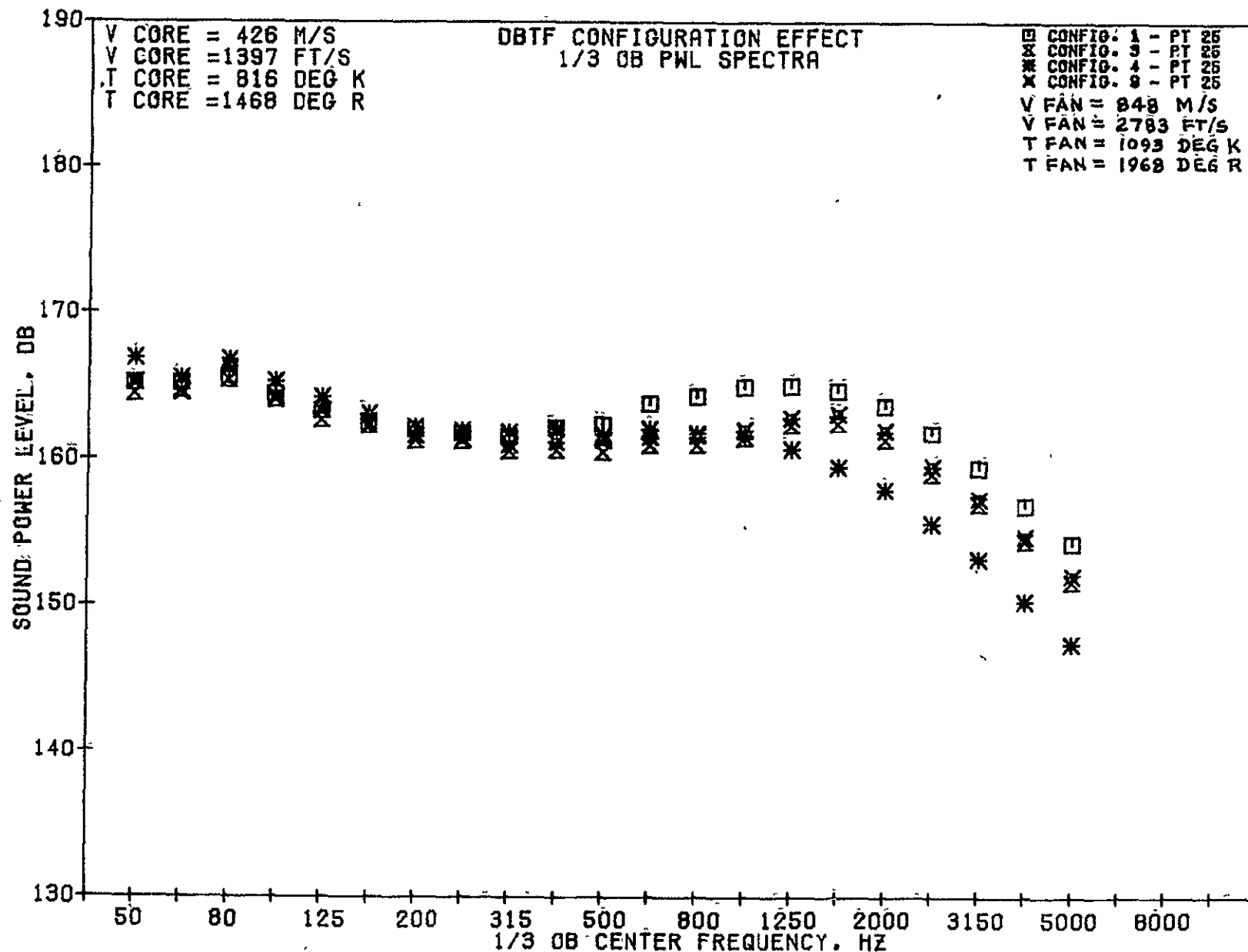
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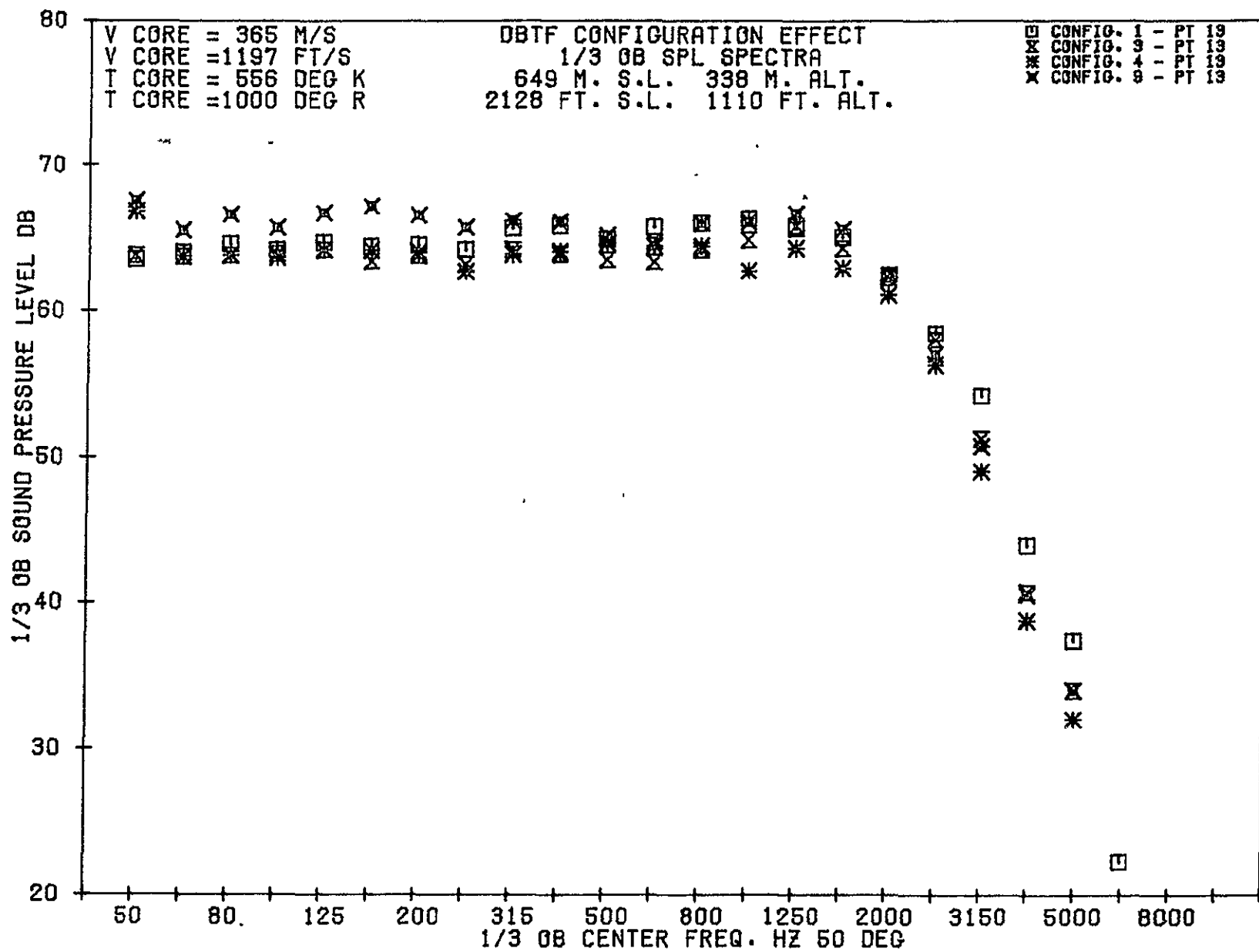
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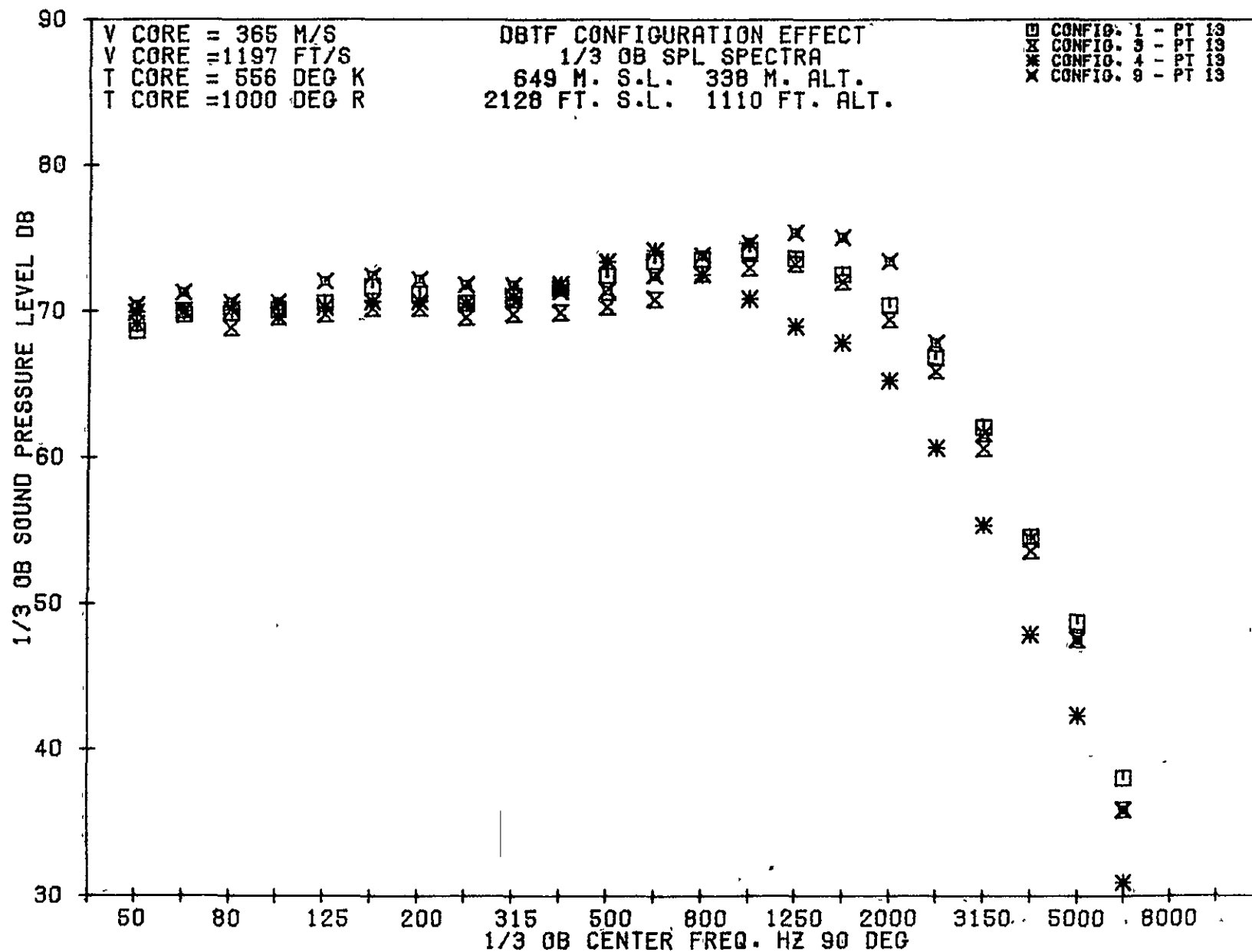


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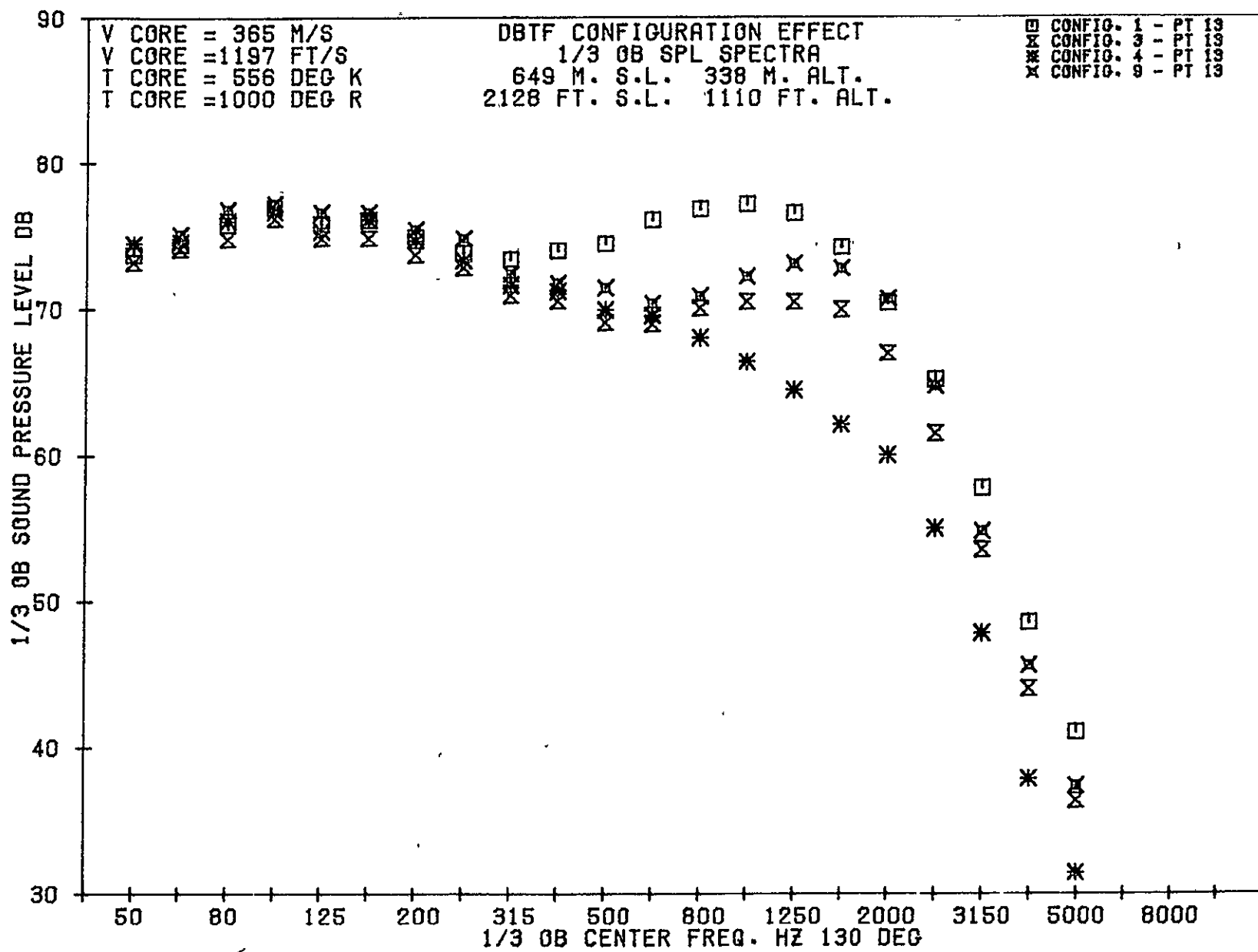
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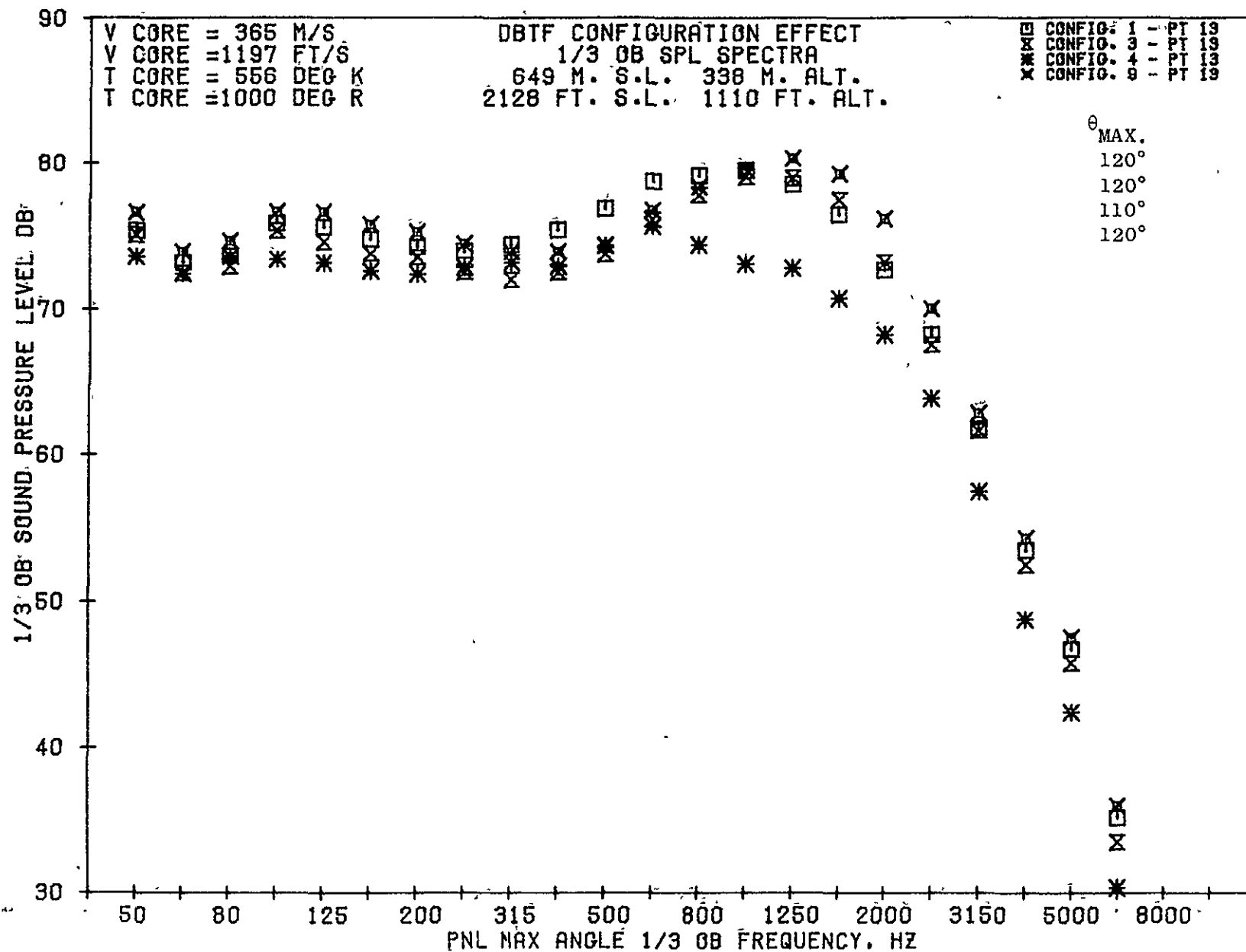
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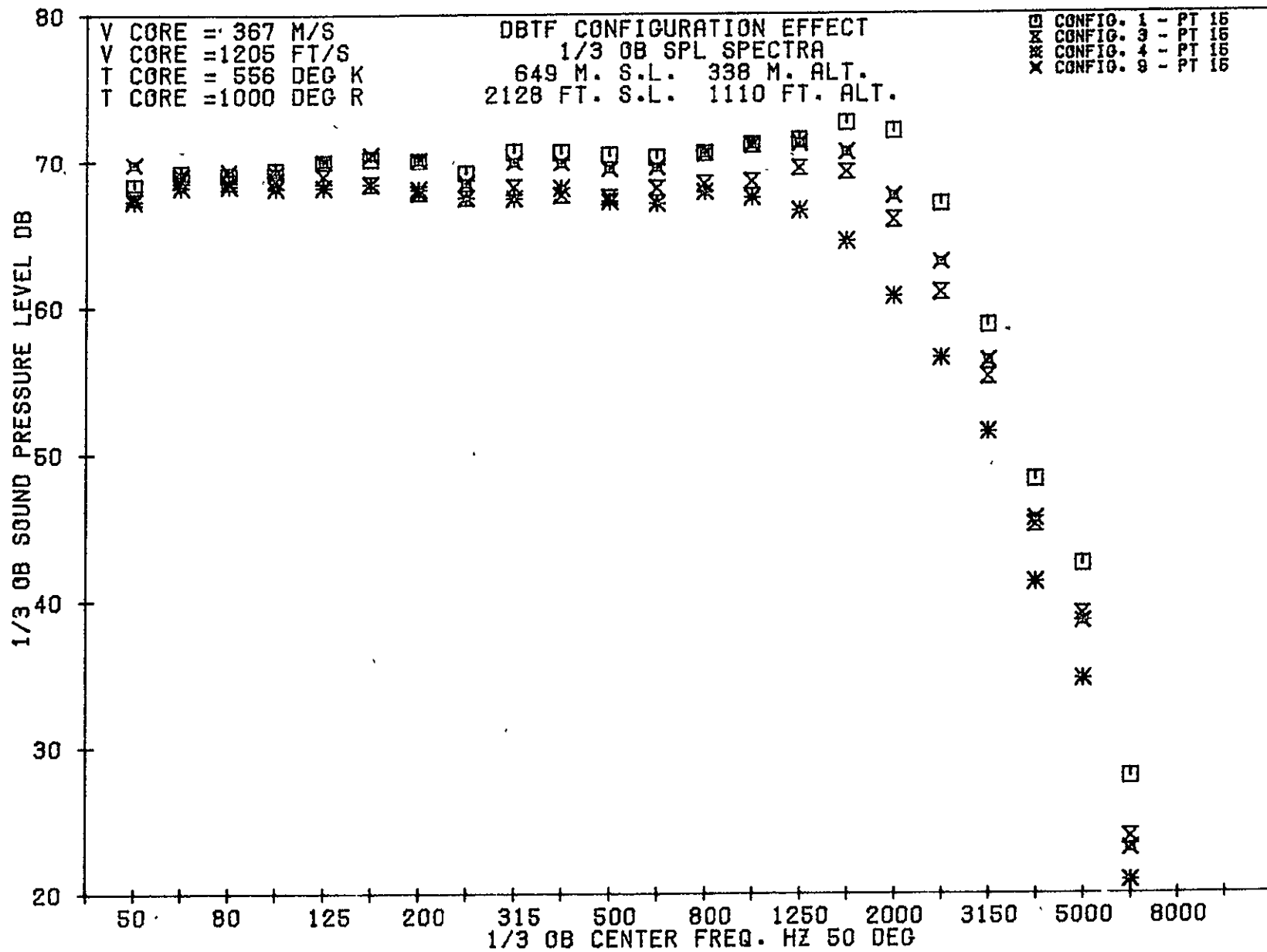


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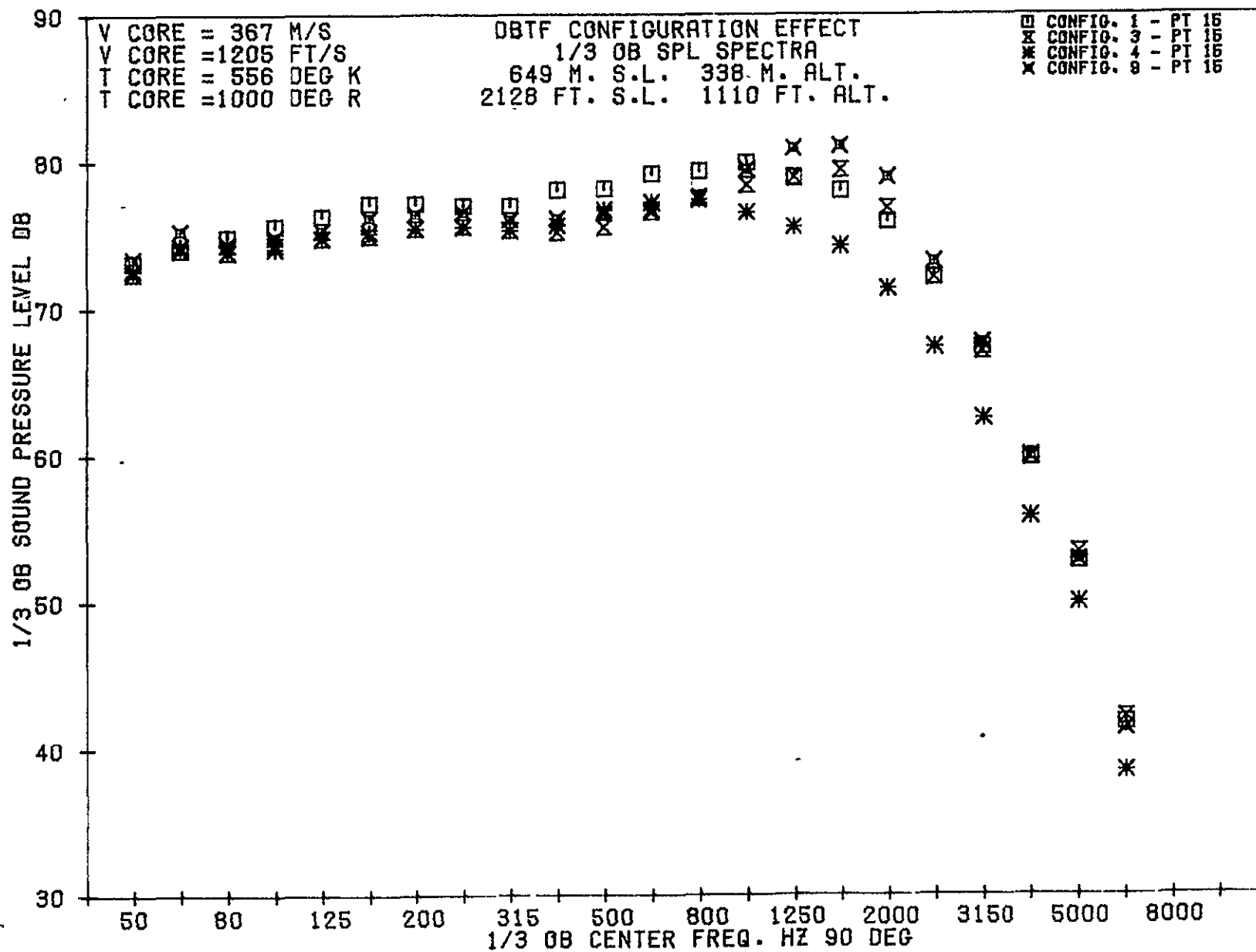


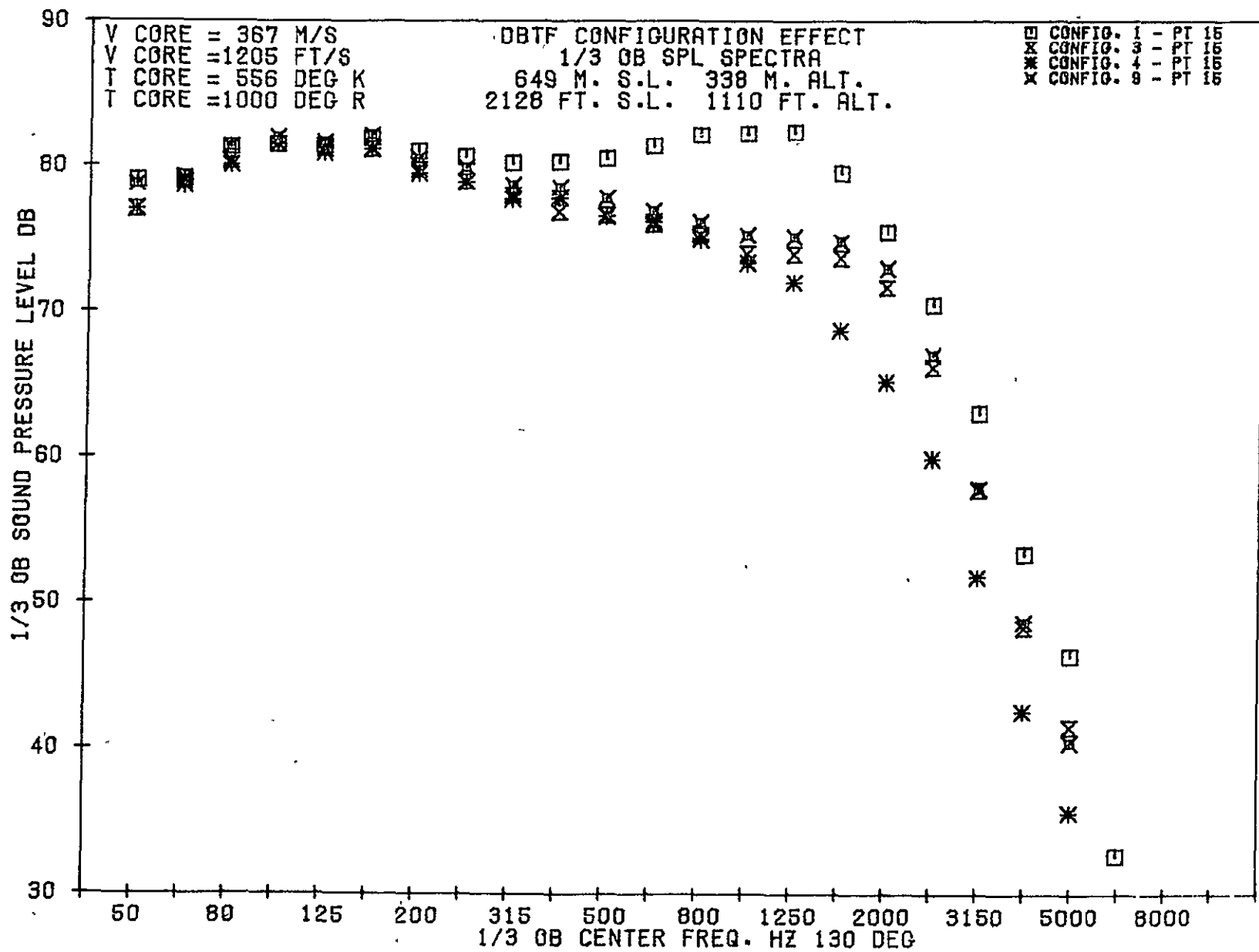
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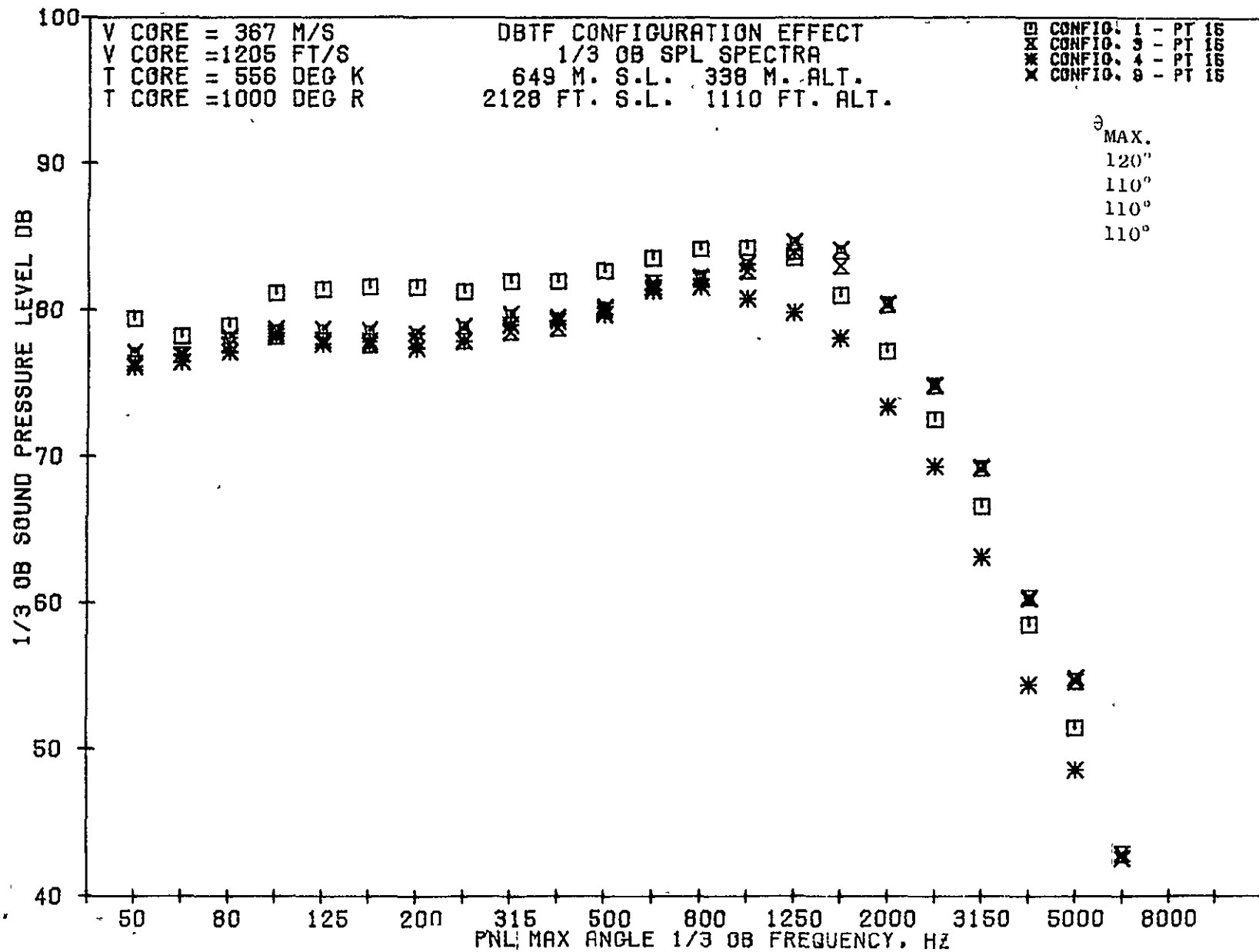
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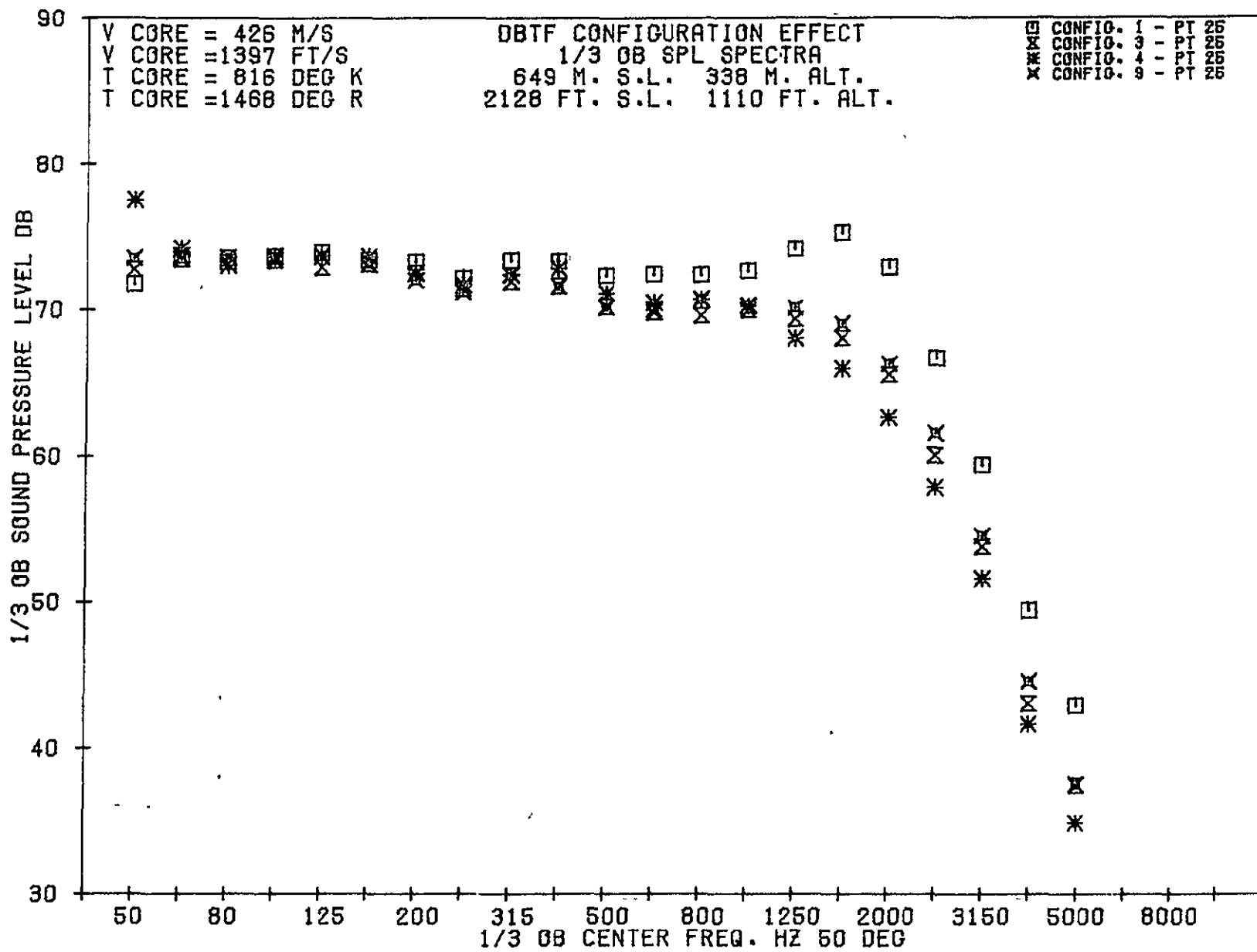


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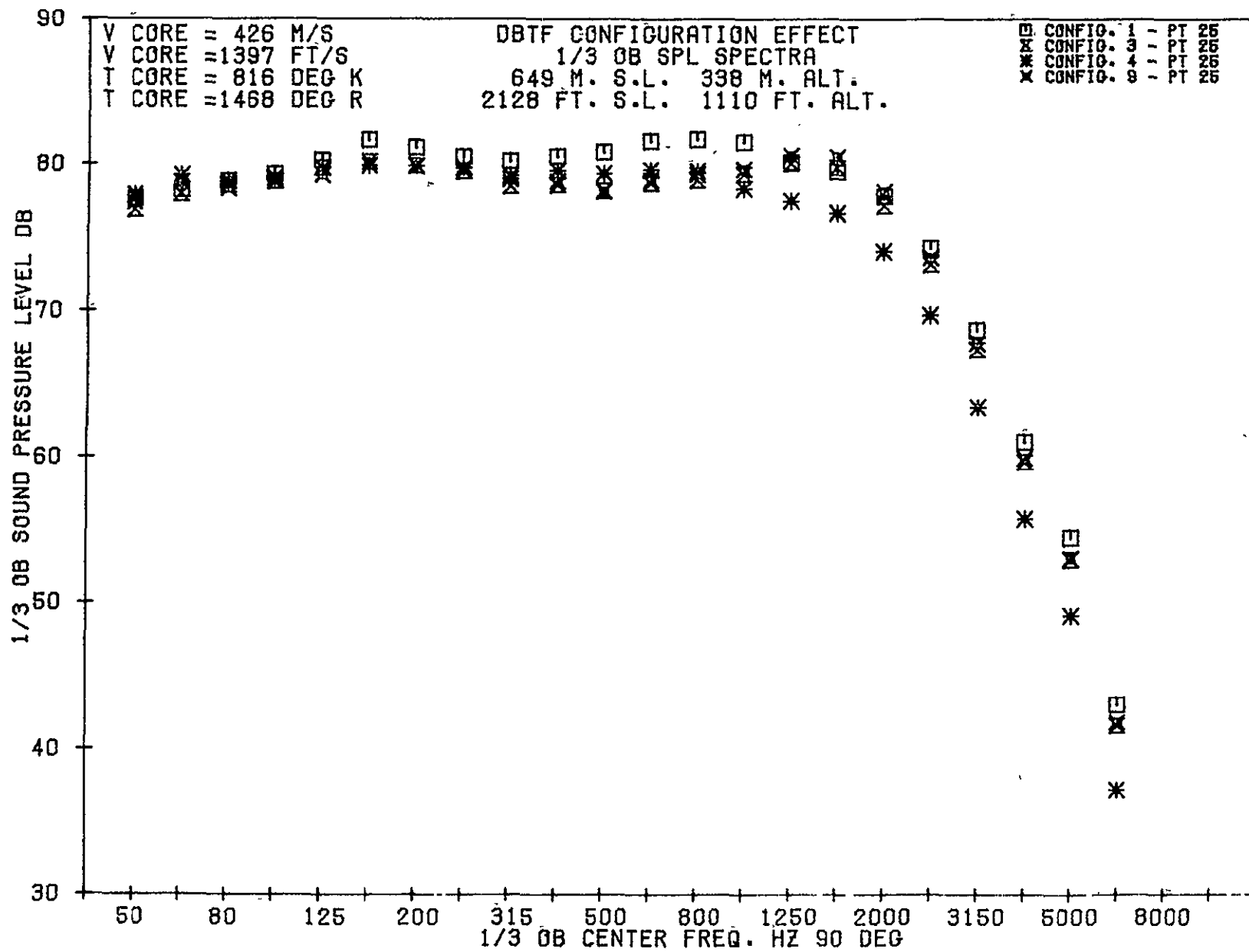
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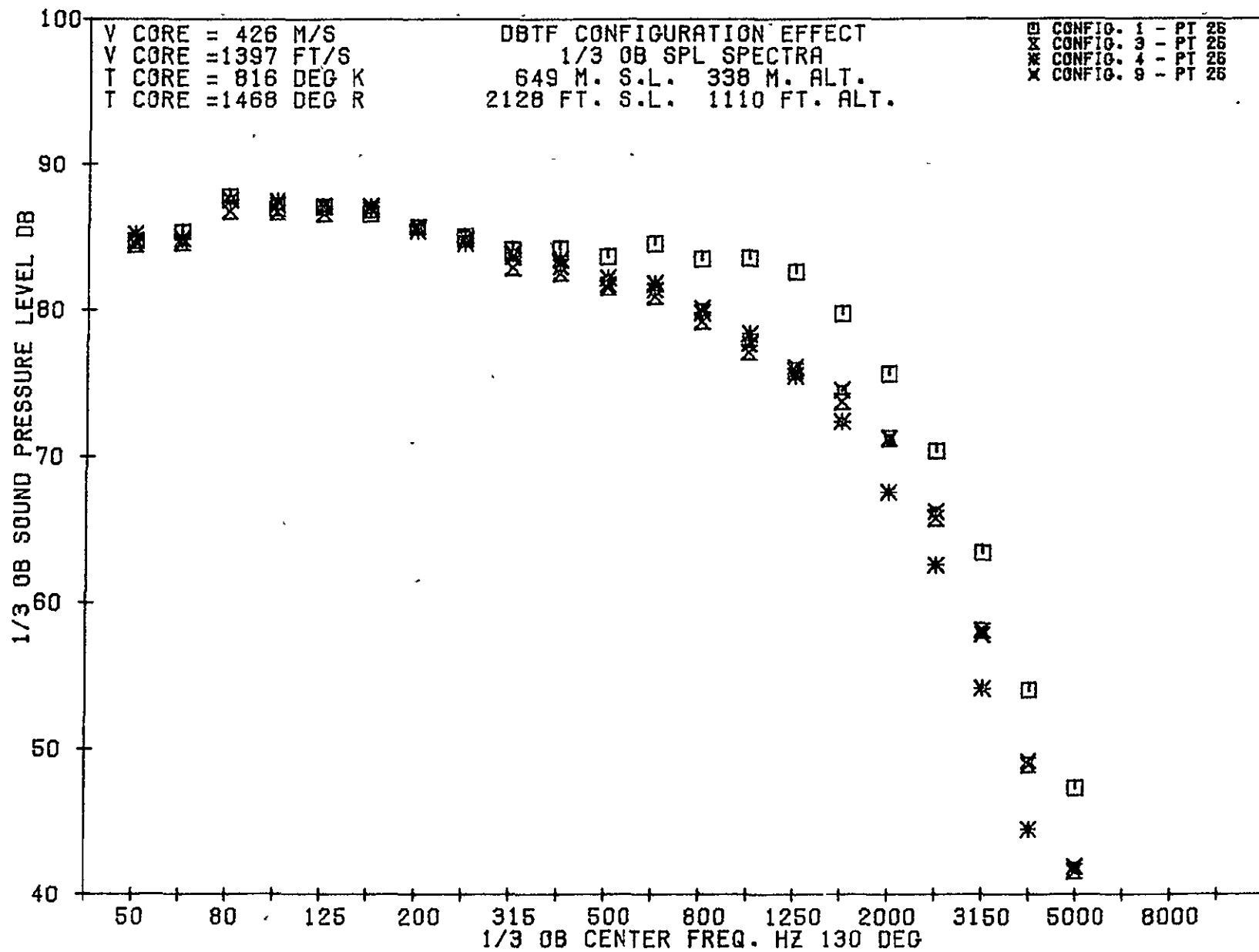


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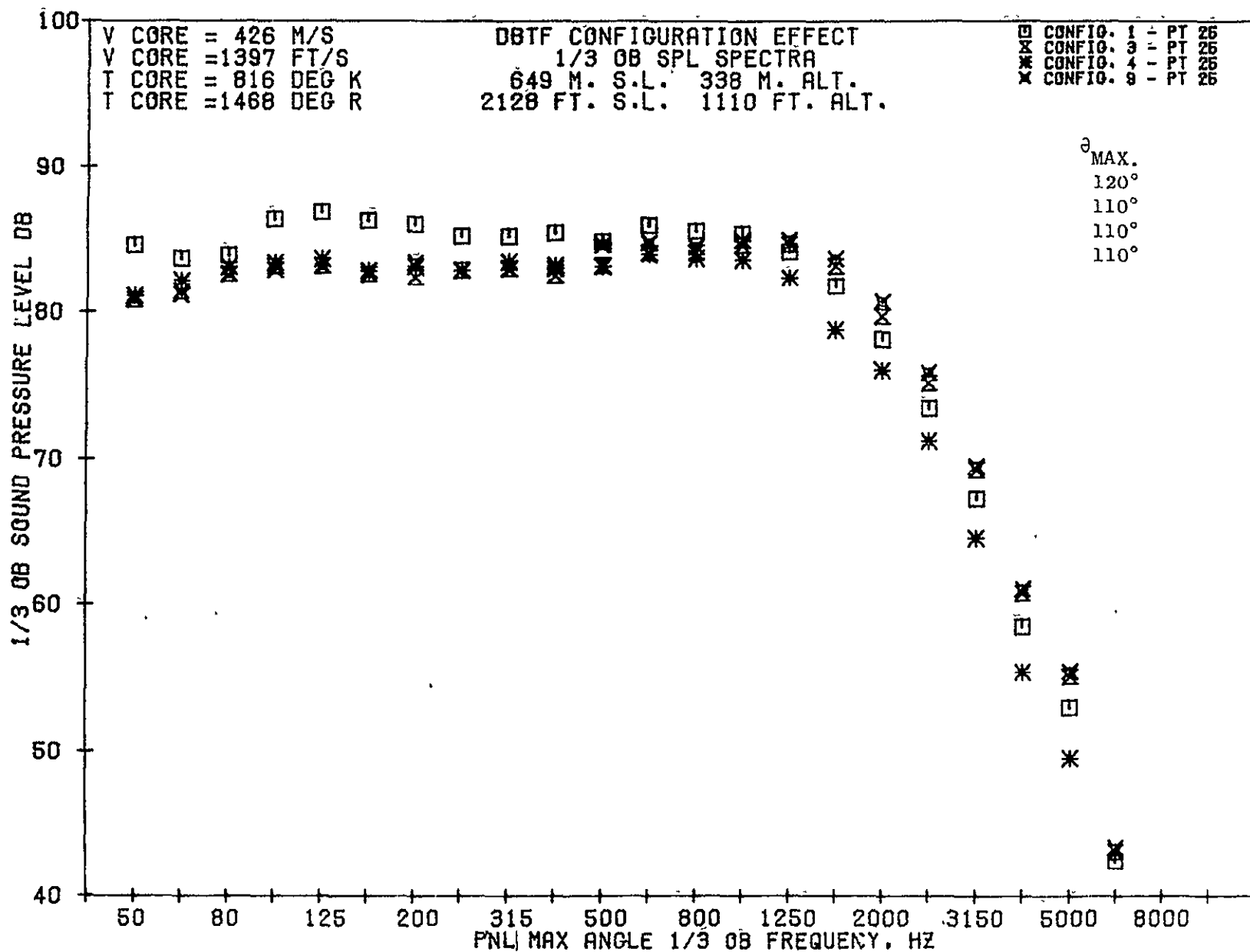
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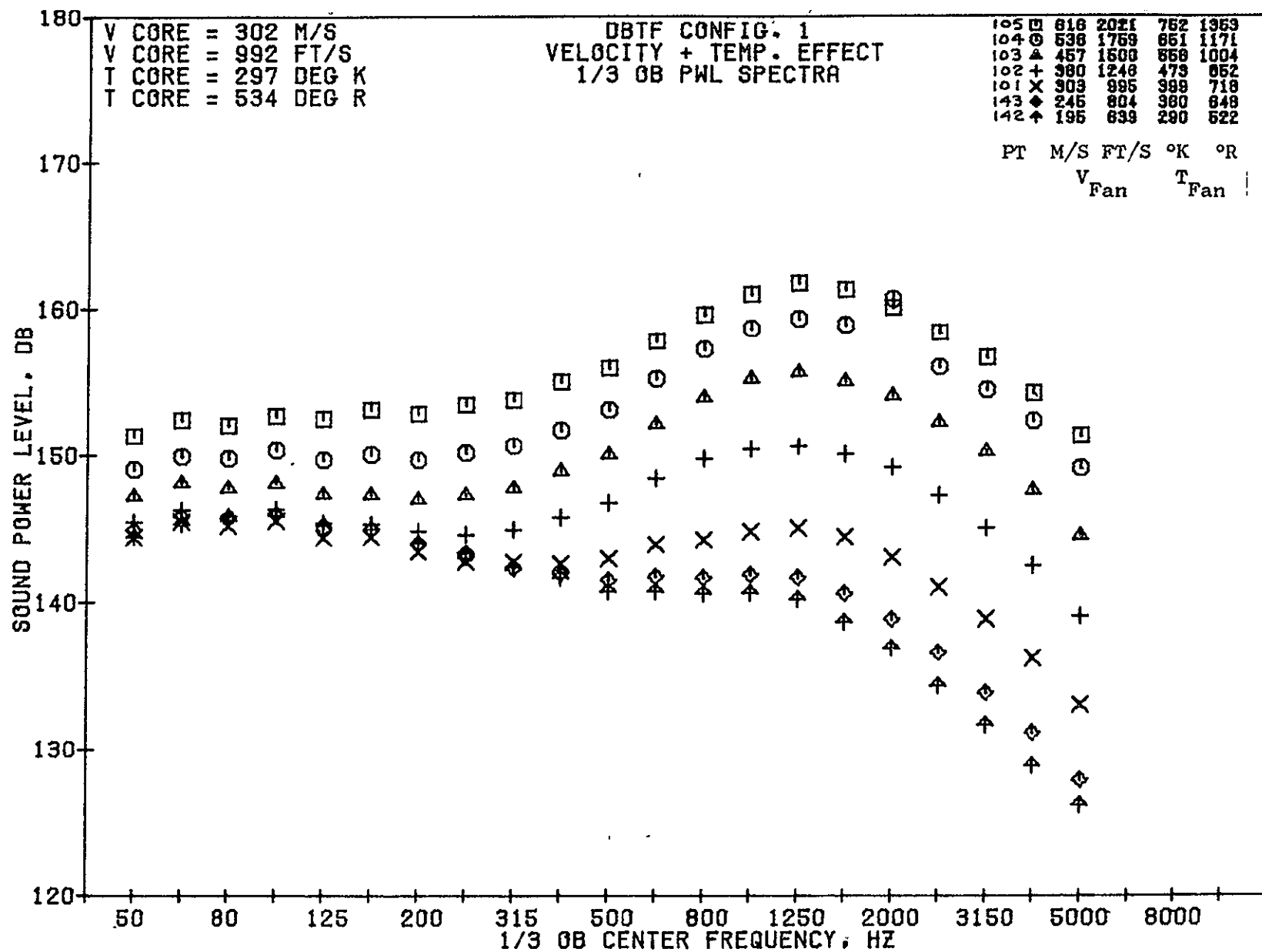


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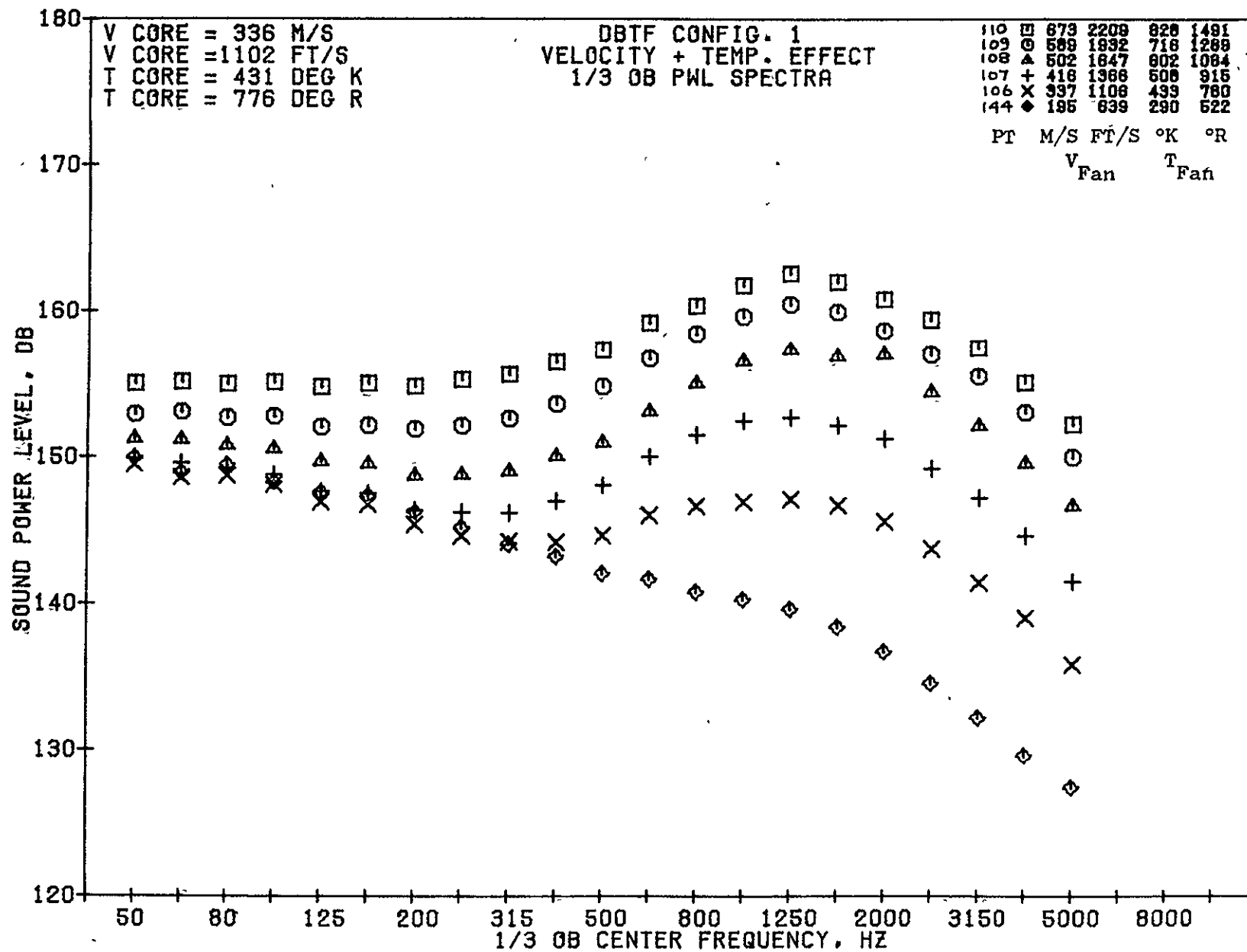
4.2 ACOUSTIC DATA PLOTS FOR A FULL SIZE ENGINE UTILIZING A SCALE FACTOR OF 8

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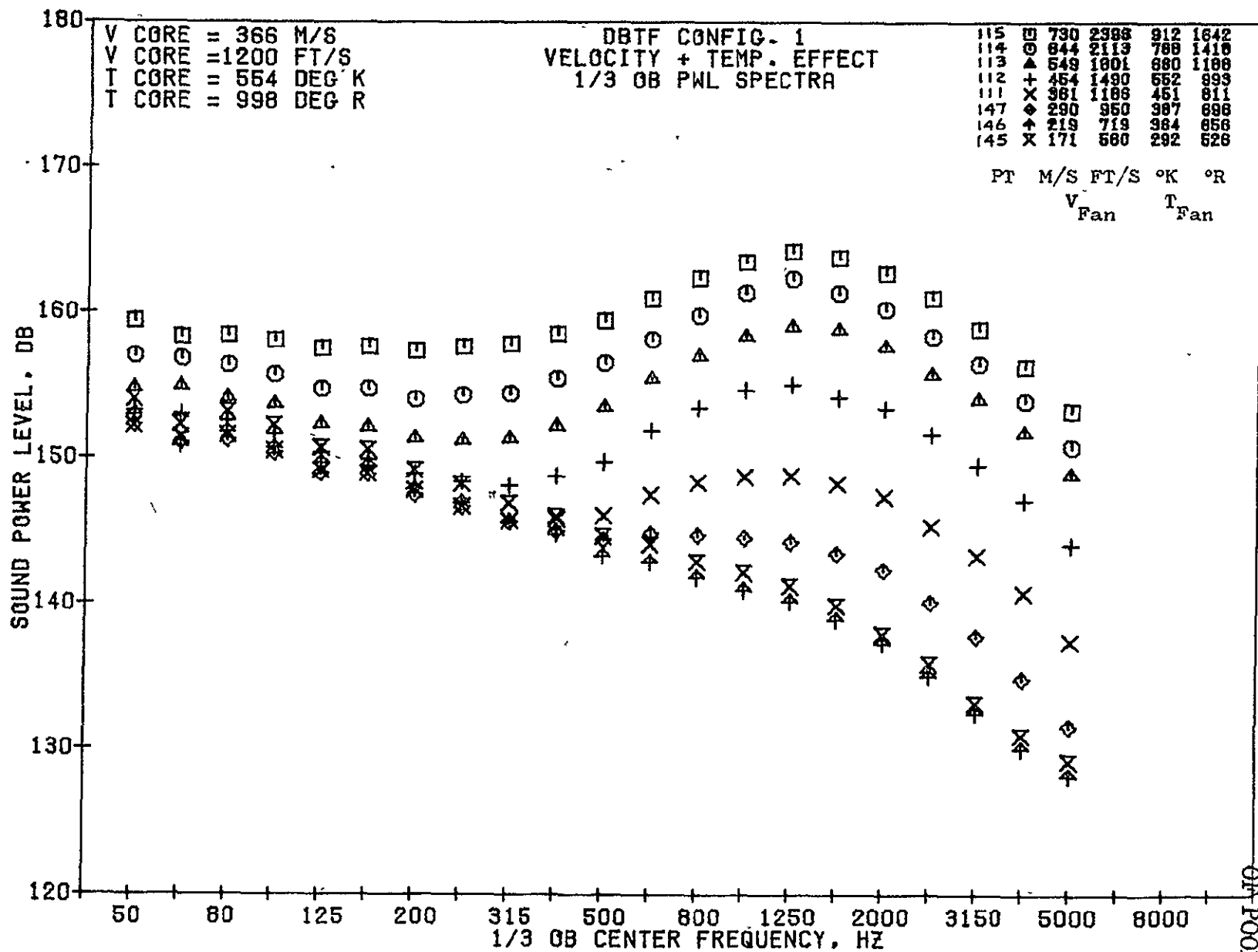
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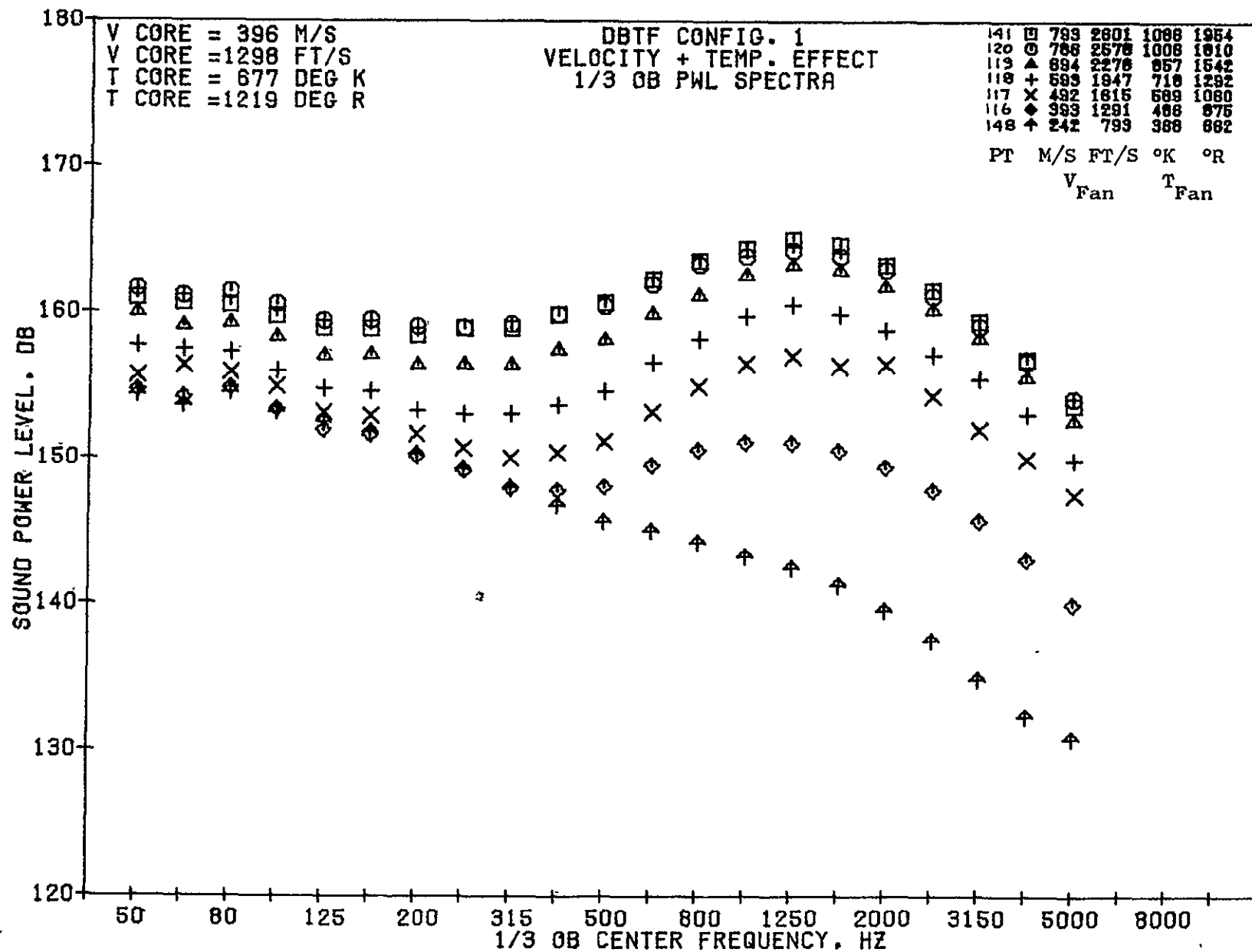
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5R031-001

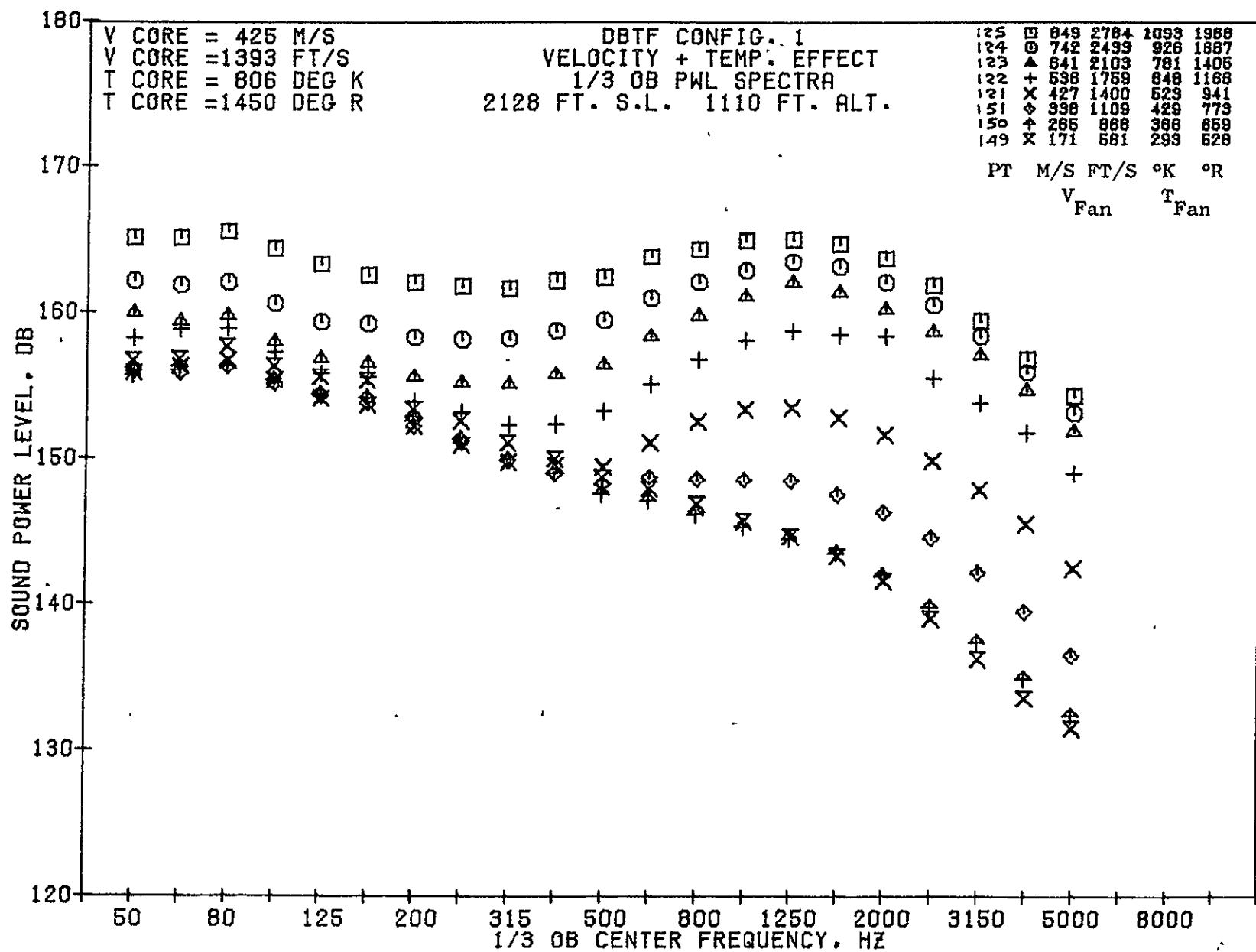
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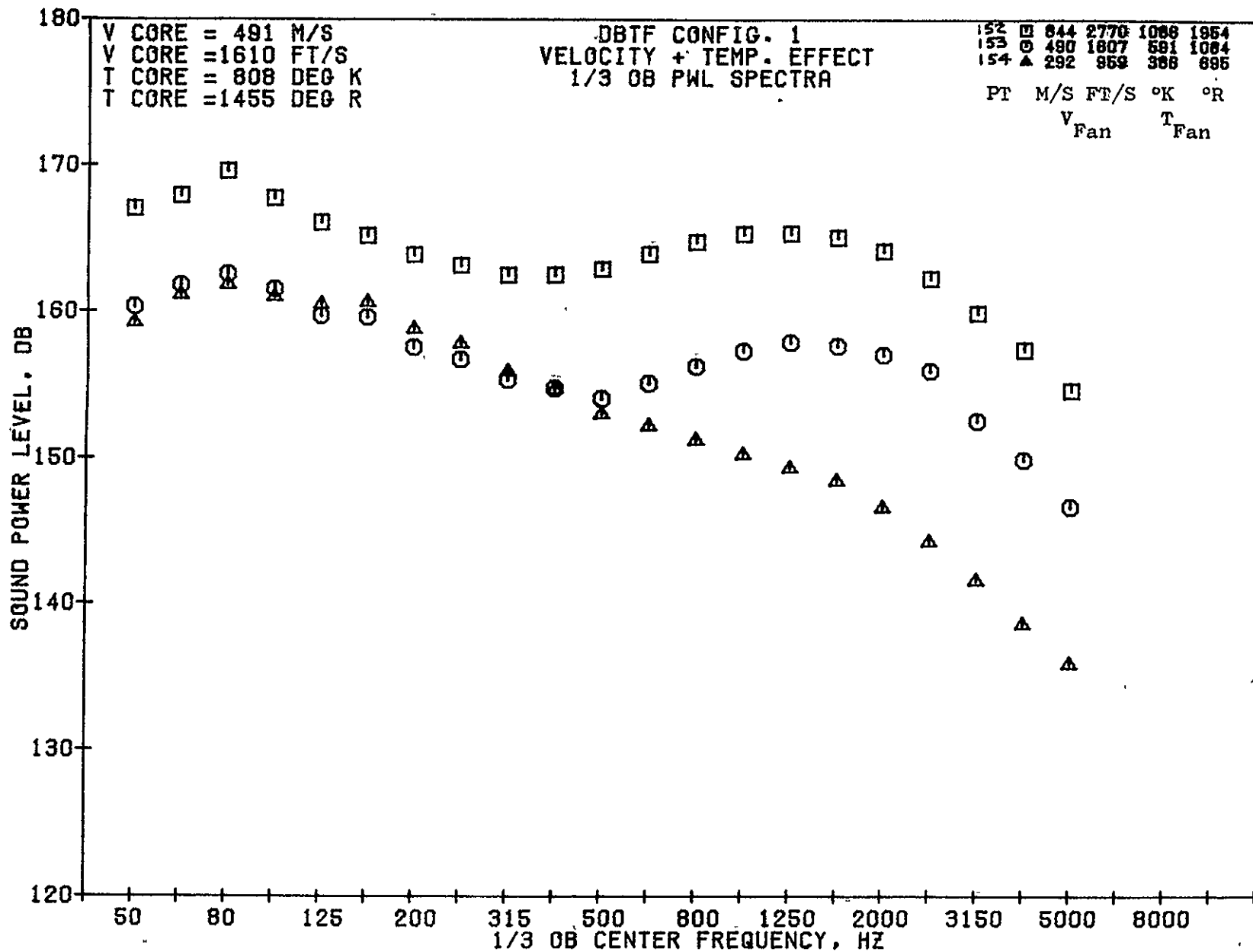
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1313

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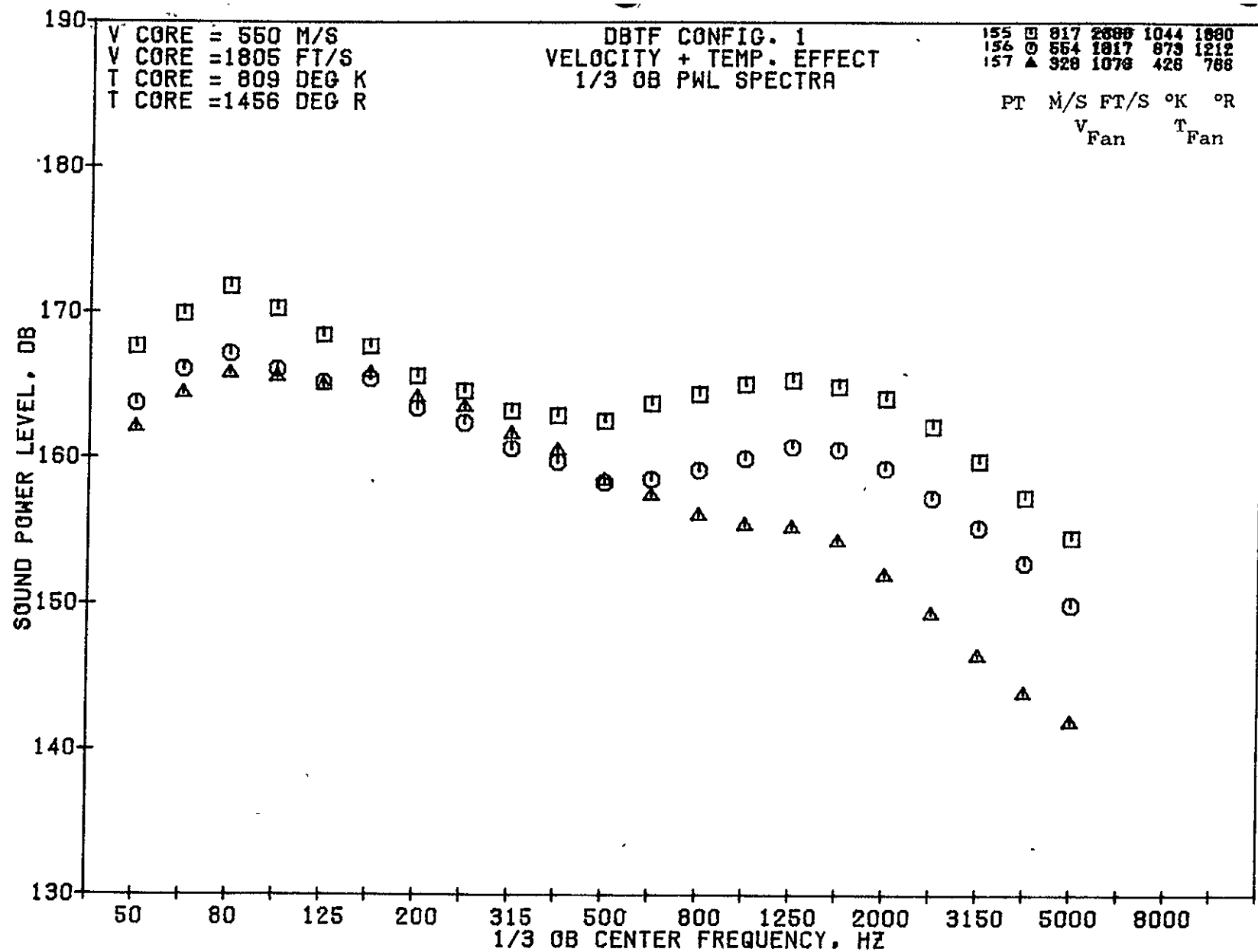
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1314



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79 BURC

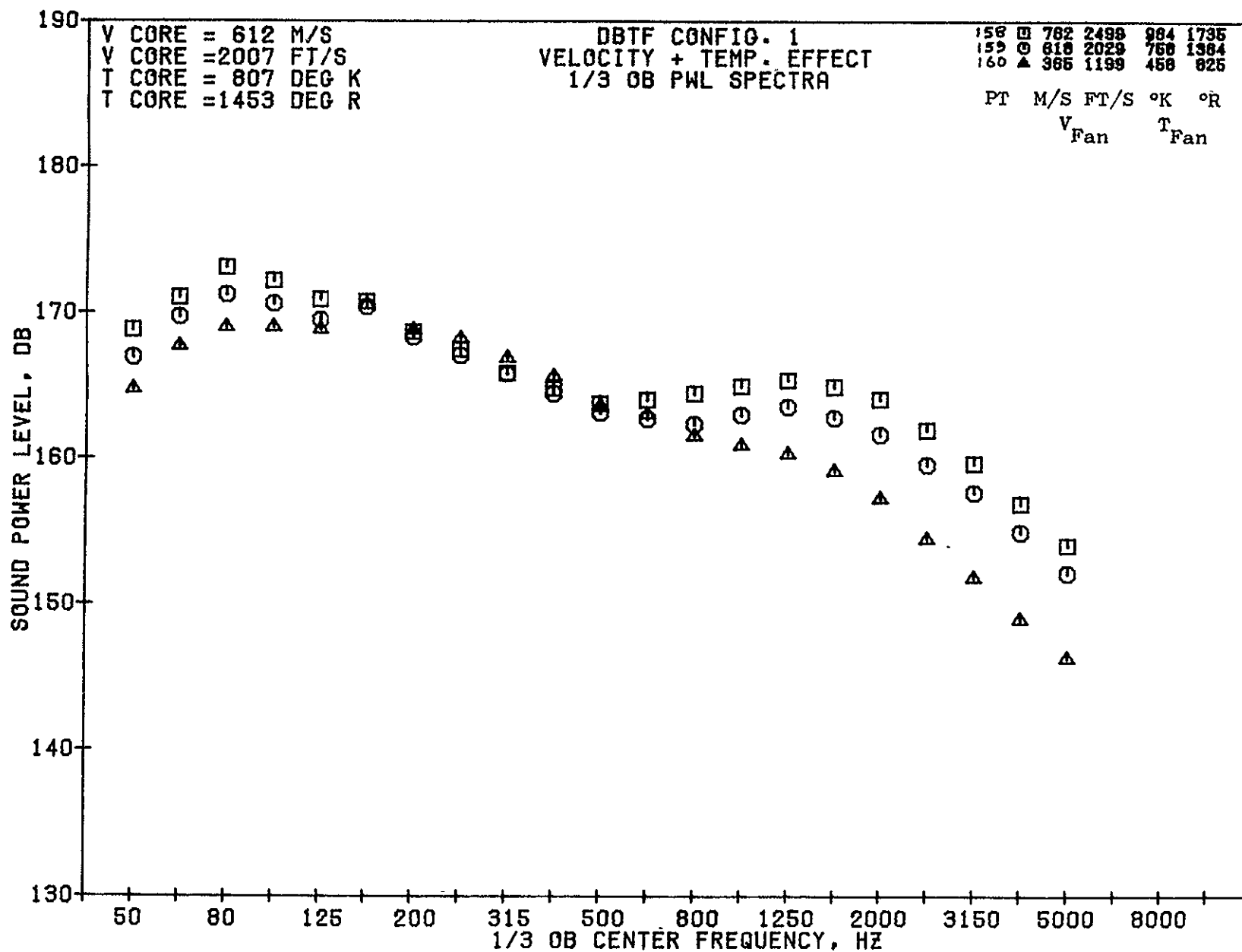


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79 BURCH A.

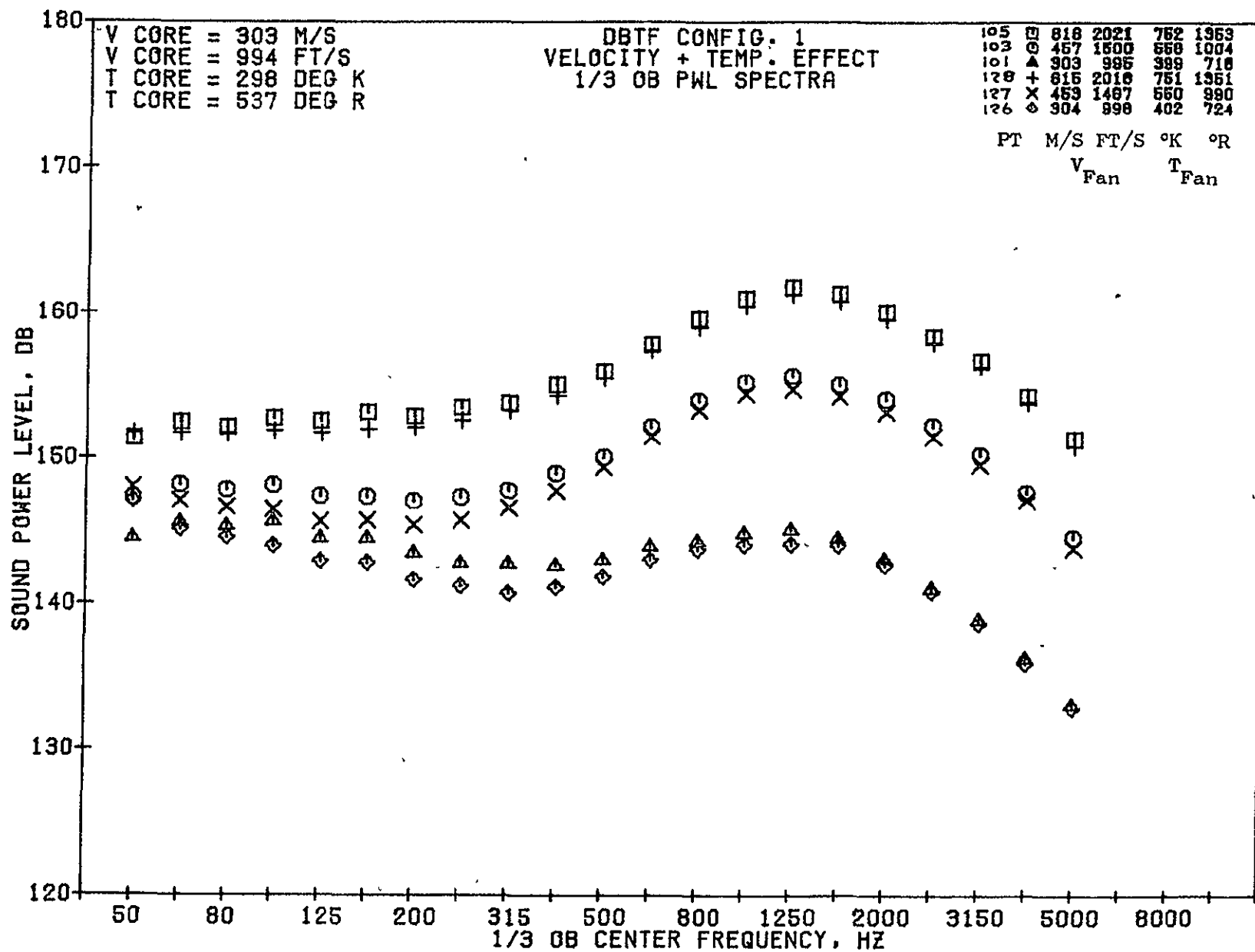
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79 BURC

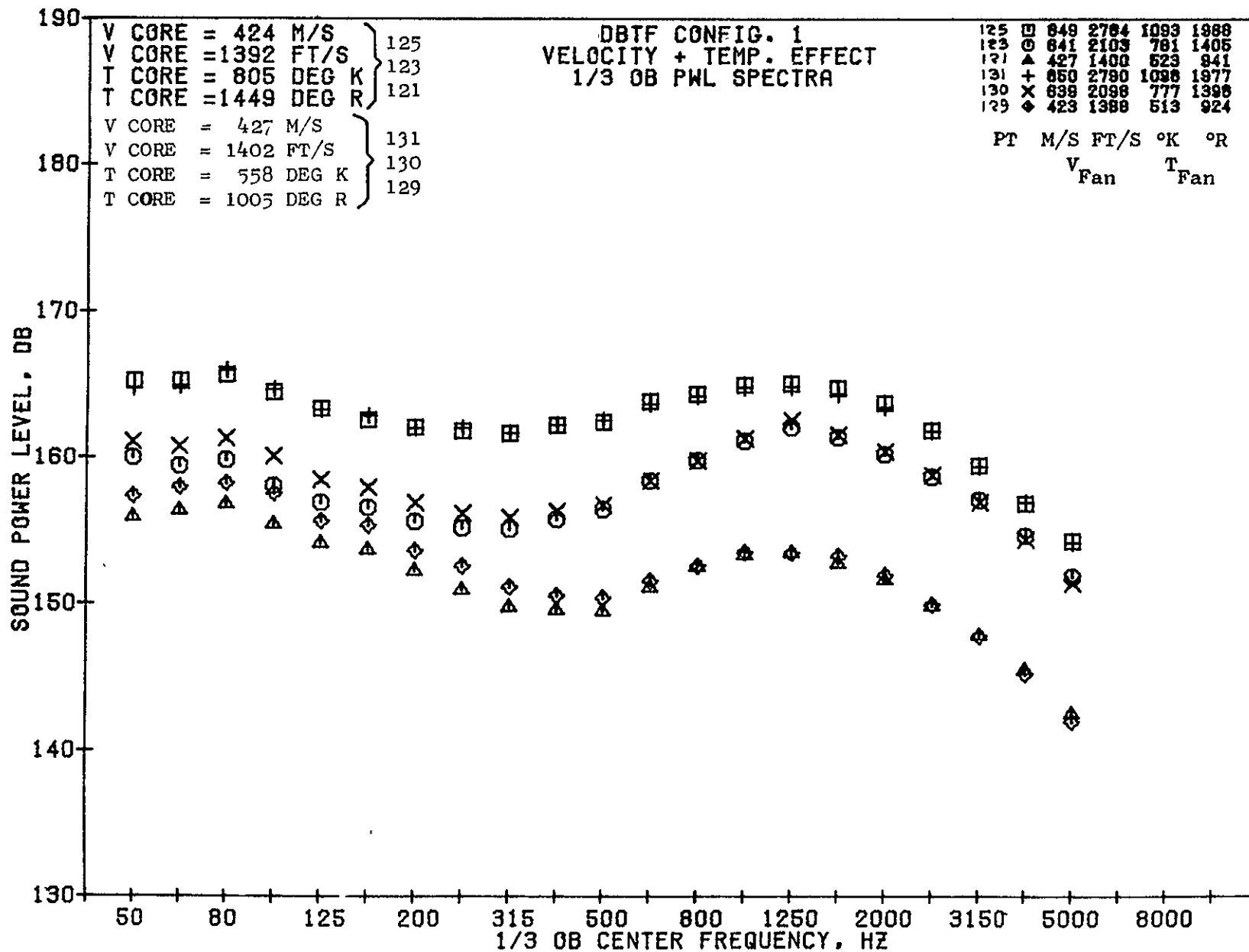


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79 BURCH A.

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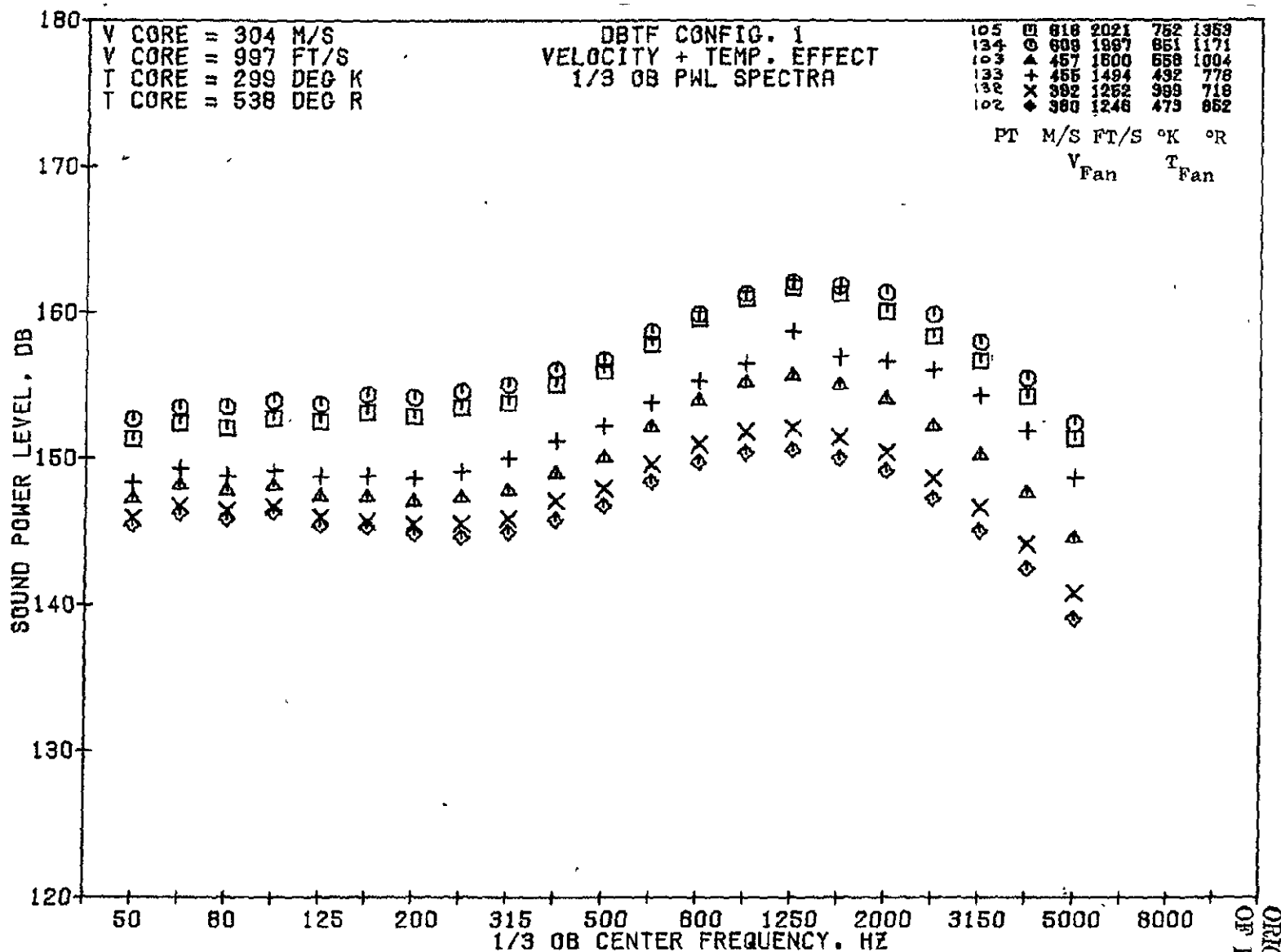
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5R031-001

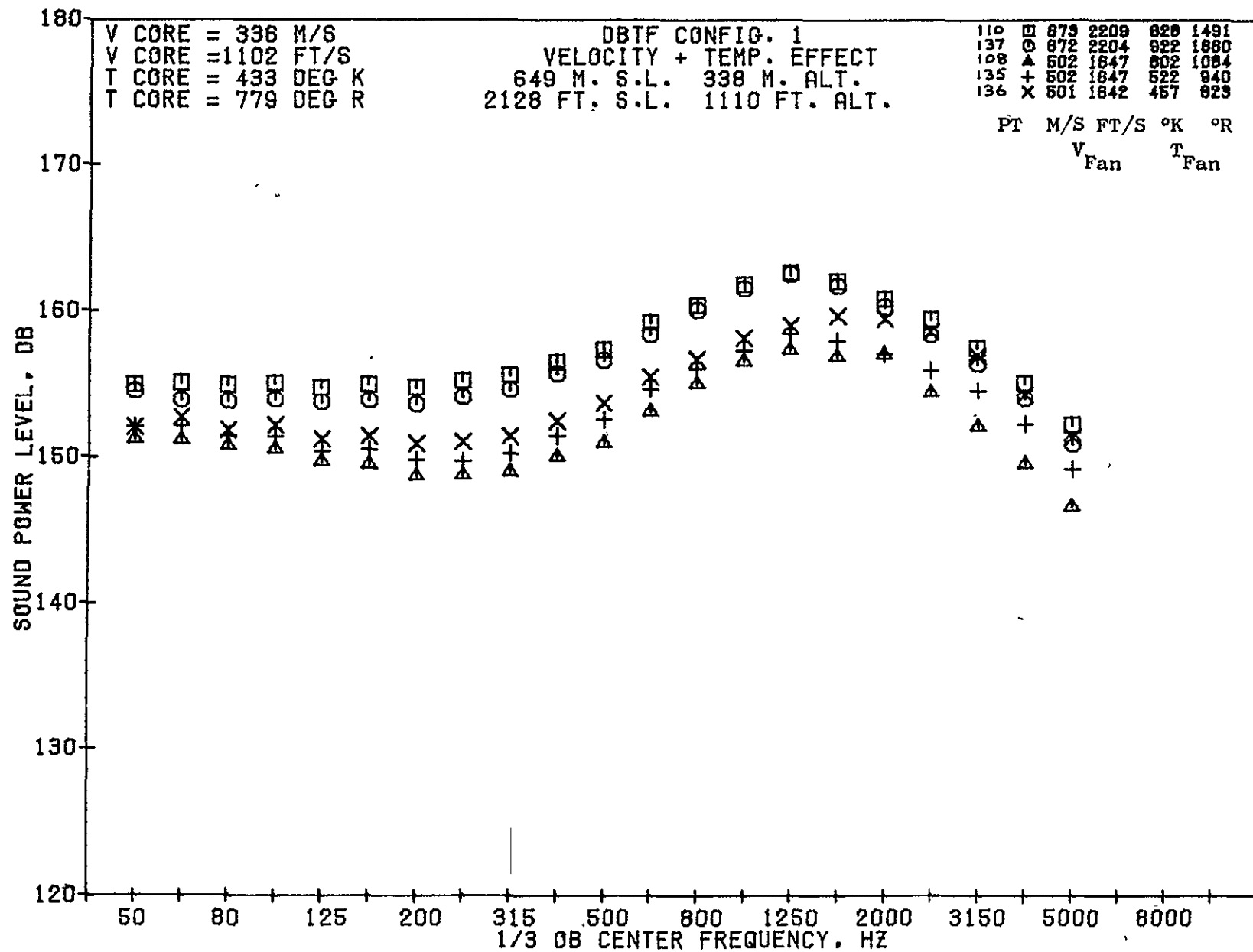
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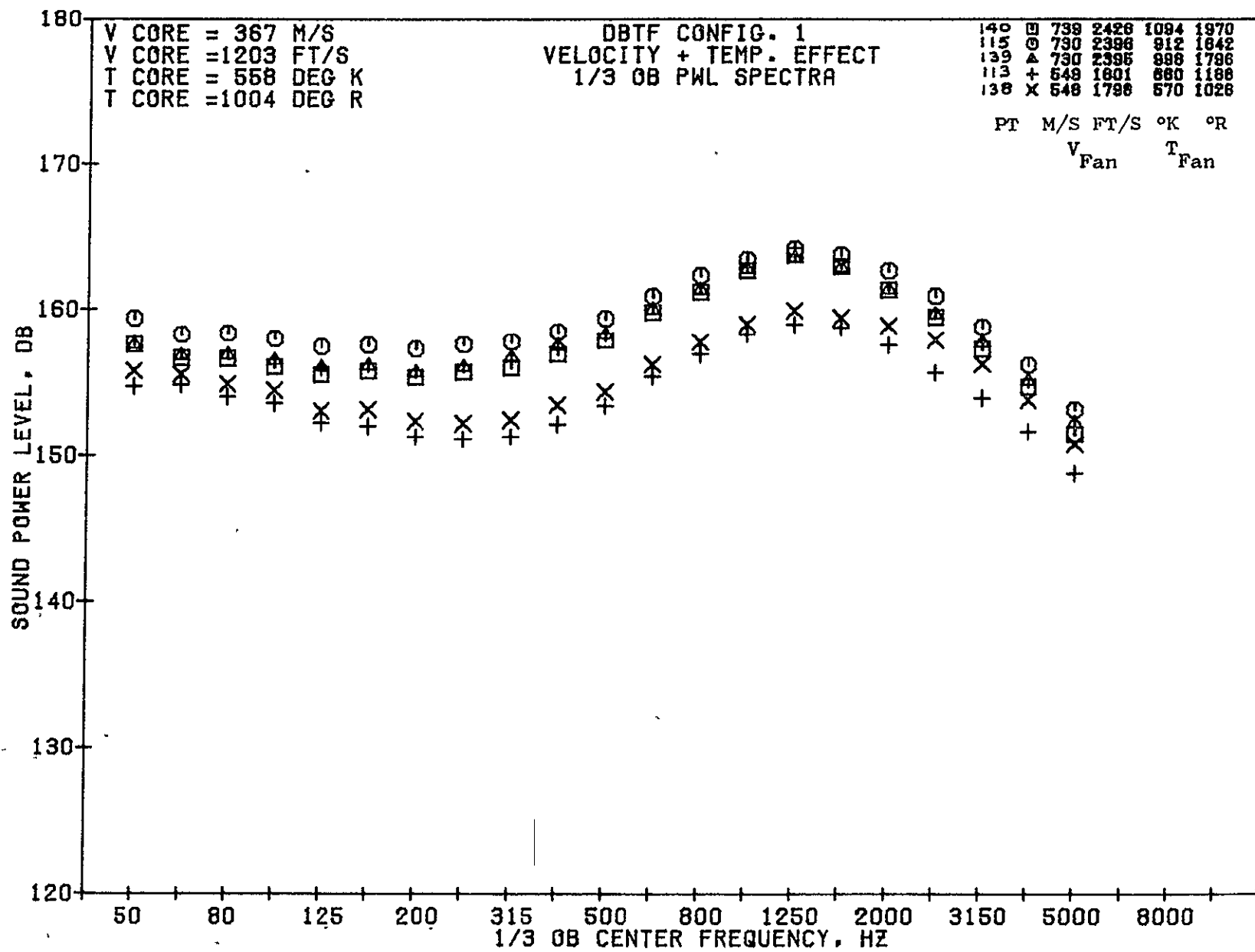
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79 BURCH



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5R266-001

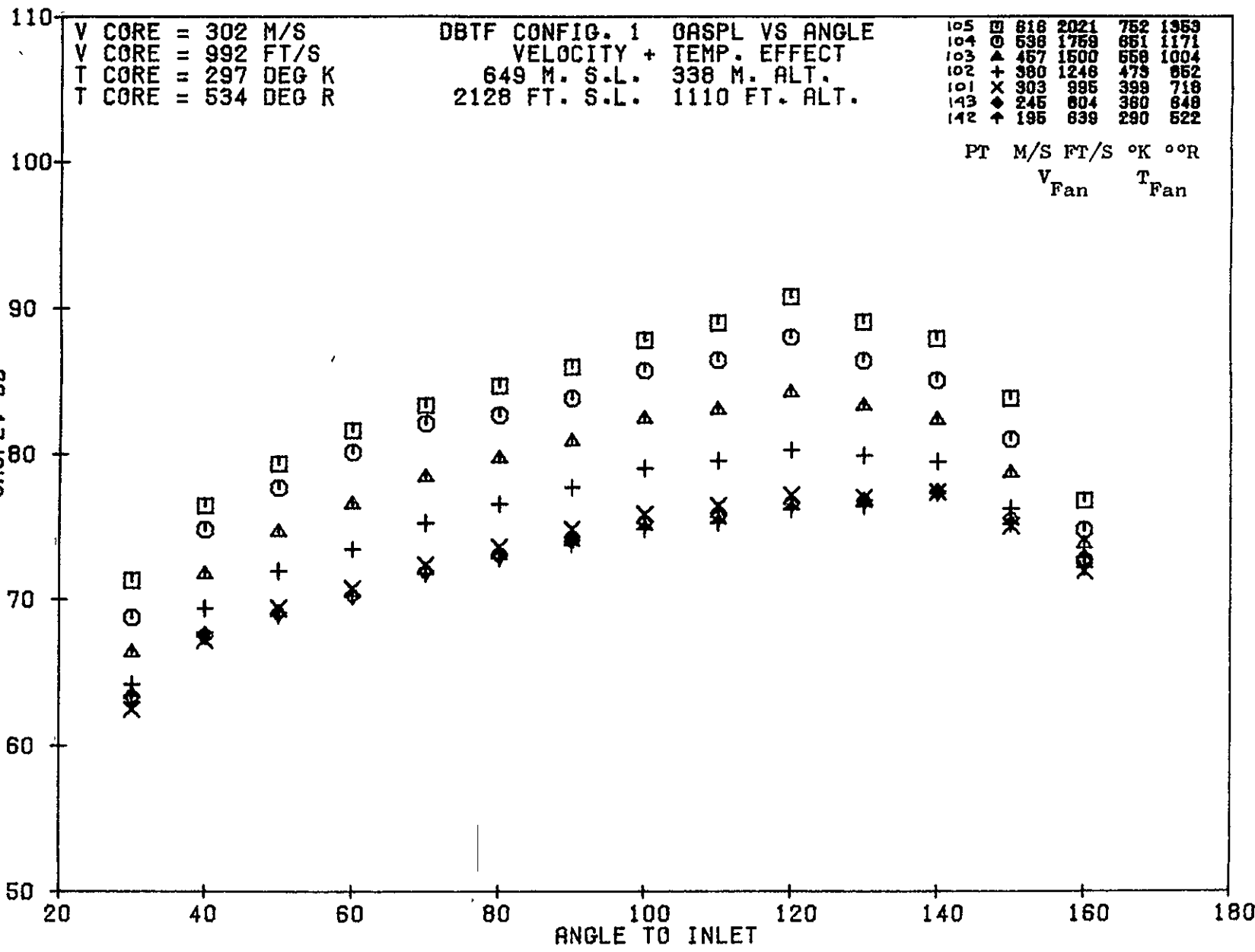
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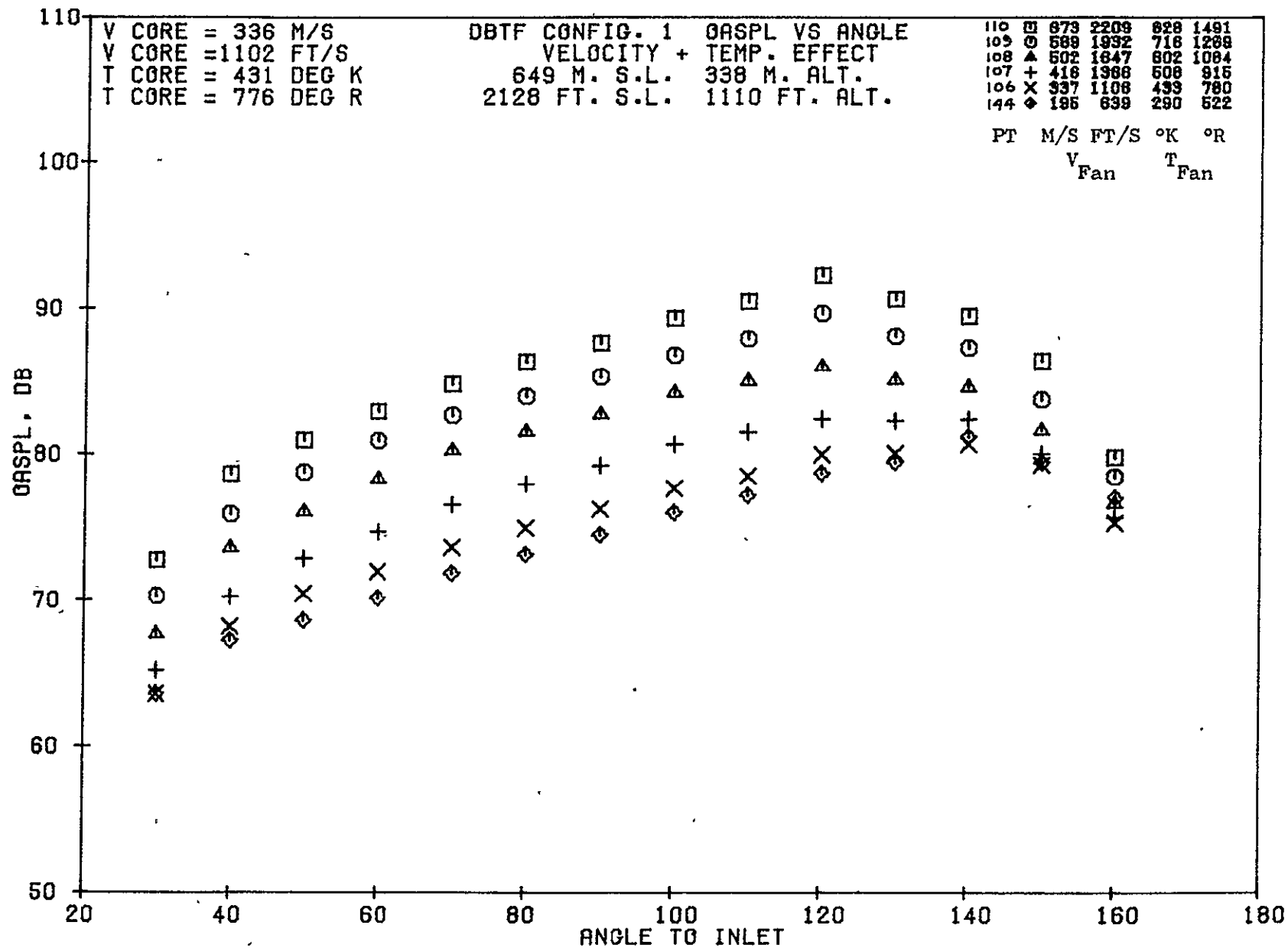
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79 BURCH A.



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79 BURC

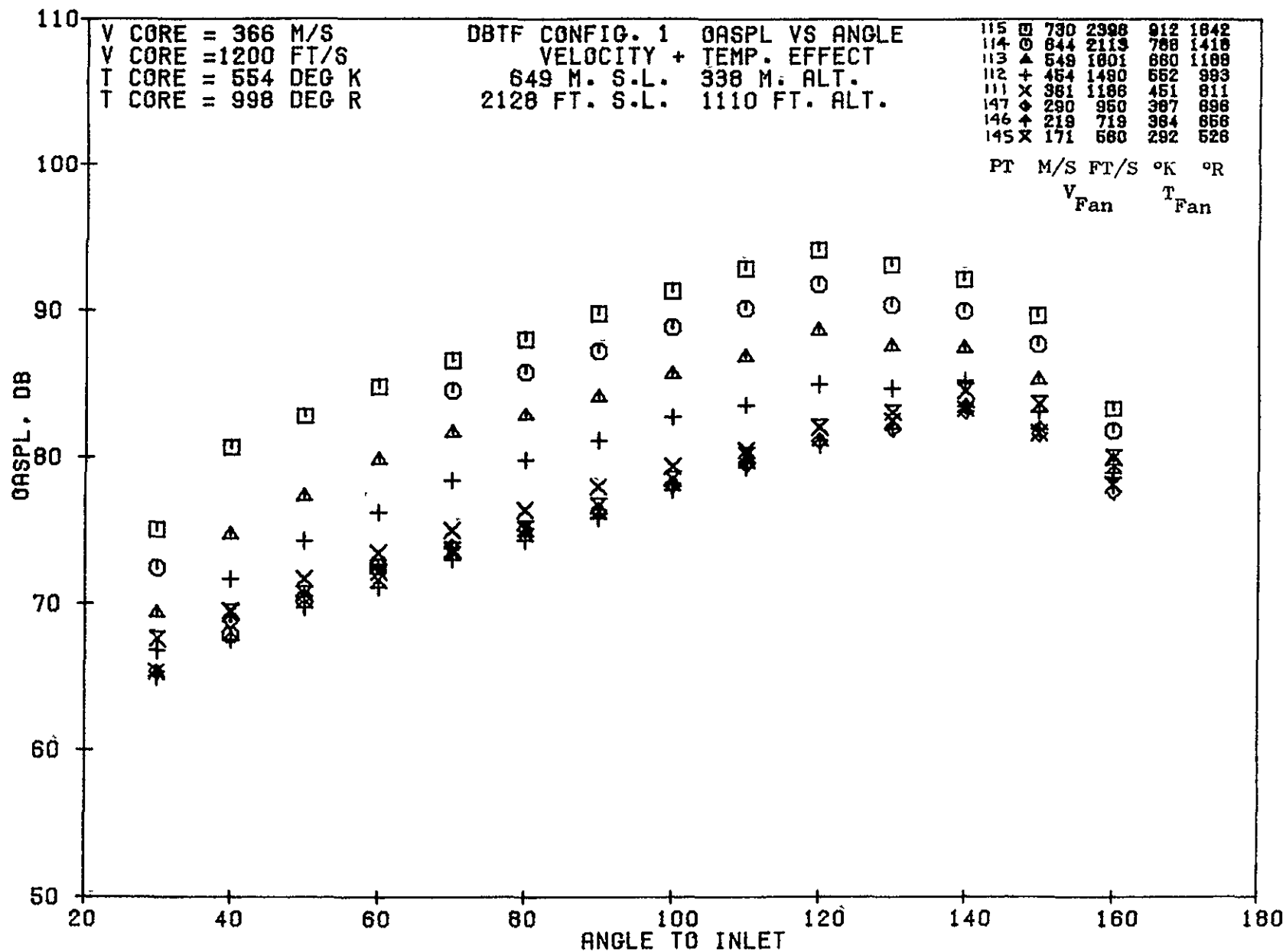


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79 BURCH A.

1324



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79 BURC A.

110

V CORE = 396 M/S
 V CORE = 1298 FT/S
 T CORE = 677 DEG K
 T CORE = 1219 DEG R

DBTF CONFIG. 1 OASPL VS ANGLE
 VELOCITY + TEMP. EFFECT
 649 M. S.L. 338 M. ALT.
 2128 FT. S.L. 1110 FT. ALT.

141	□	789	2801	1088	1854
120	○	788	2576	1008	1810
119	△	884	2278	857	1542
118	+	593	1947	718	1292
117	x	492	1815	589	1060
116	◇	393	1281	488	875
148	†	242	789	388	682

PT M/S FT/S °K °R
 V Fan T Fan

OASPL, DB

50

60

70

80

90

100

20

40

60

80

100

120

140

160

180

ANGLE TO INLET

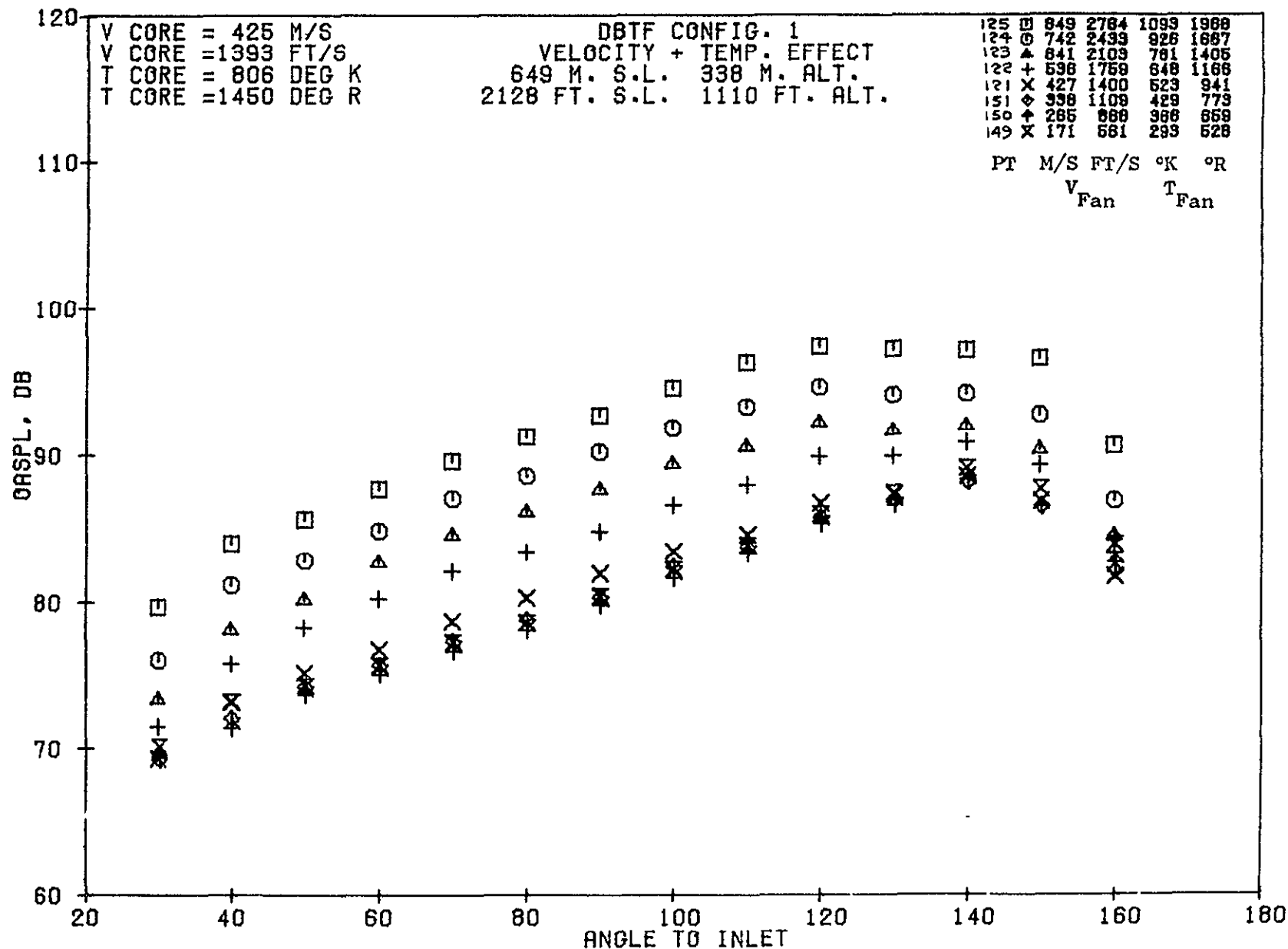
1325

08/13/75
 5R031-001

79 BURCH A.

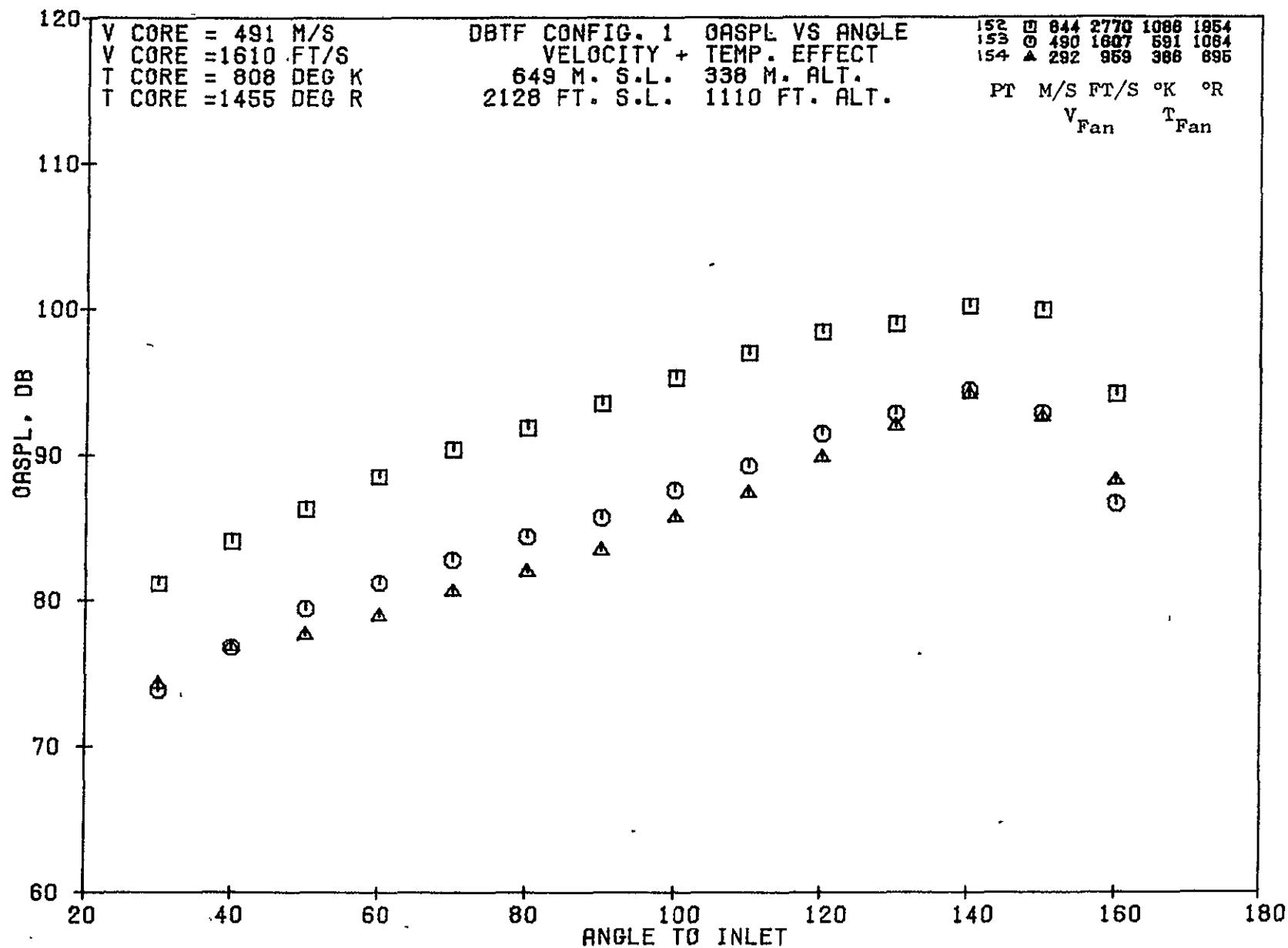
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11-96



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79 BURCH.



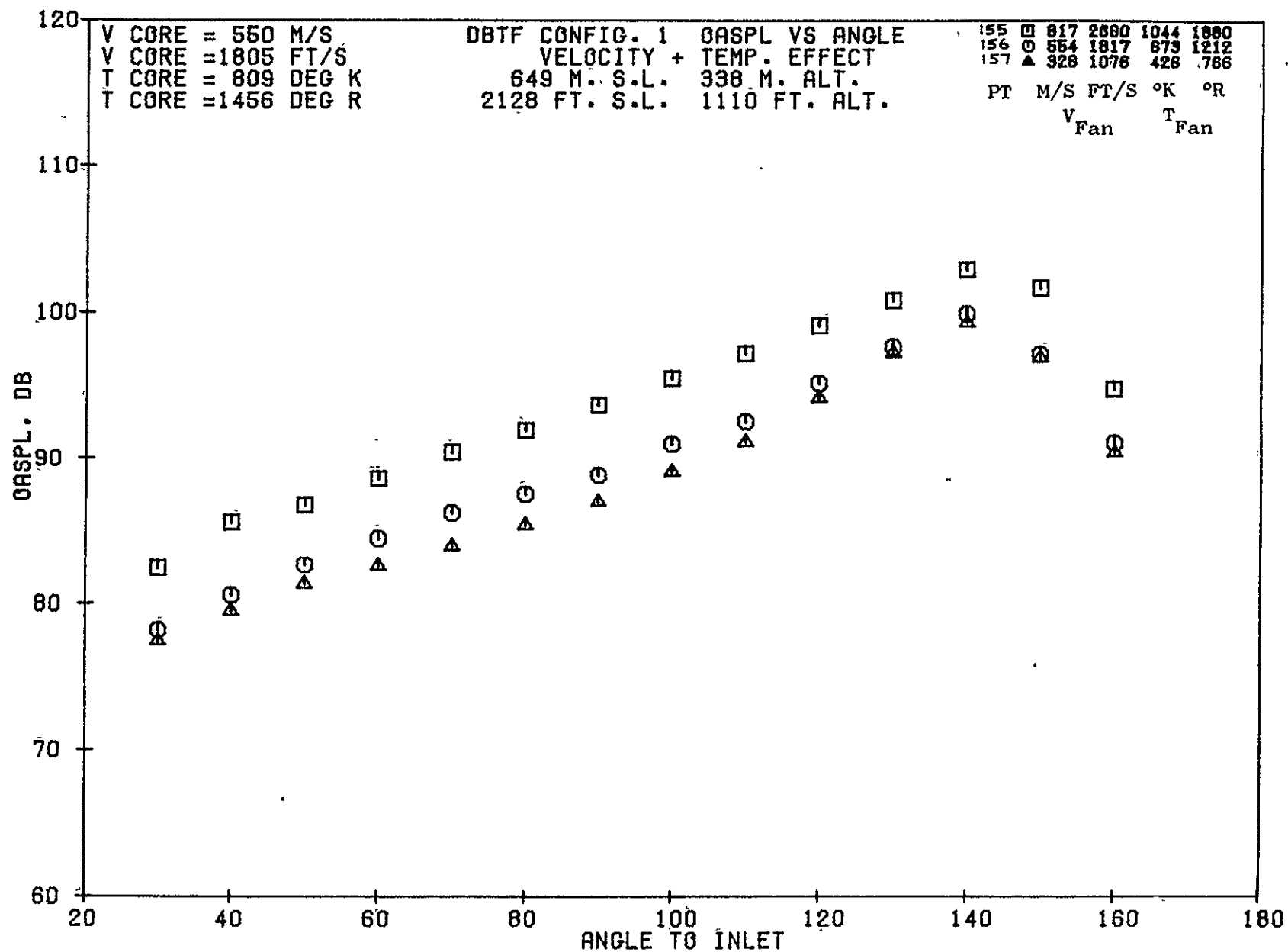
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5R031-001

79 BURCH A.

4-100

1328



08/13/75
5R031-001.

79 BURQA.

120

V CORE = 612 M/S
 V CORE = 2007 FT/S
 T CORE = 807 DEG K
 T CORE = 1453 DEG R

DBTF CONFIG. 1 GASPL VS ANGLE
 VELOCITY + TEMP. EFFECT
 649 M. S.L. 338 M. ALT.
 2128 FT. S.L. 1110 FT. ALT.

PT	M/S	FT/S	°K	°R
158	782	2488	984	1738
159	818	2029	768	1384
160	385	1199	458	825

V_{Fan} T_{Fan}

110

100

90

80

70

60

GASPL, DB

20

40

60

80

100

120

140

160

180

ANGLE TO INLET

1329

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 SR031-001

79 BURCH A.

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#102

V CORE = 303 M/S } 105
 V CORE = 994 FT/S } 103
 T CORE = 298 DEG K } 101
 T CORE = 537 DEG R }
 V CORE = 304 M/S } 128
 V CORE = 998 FT/S } 127
 T CORE = 558 DEG K } 126
 T CORE = 1004 DEG R }

DBTF CONFIG. 1 GASPL VS ANGLE
 VELOCITY + TEMP. EFFECT
 649 M: S.L. 338 M: ALT.
 2128 FT: S.L. 1110 FT. ALT.

PT	M/S	FT/S	°K	°R
	V _{Fan}		T _{Fan}	
105	616	2021	752	1359
103	457	1500	558	1004
101	303	995	388	718
128	615	2018	751	1351
127	453	1487	550	990
126	304	998	402	724

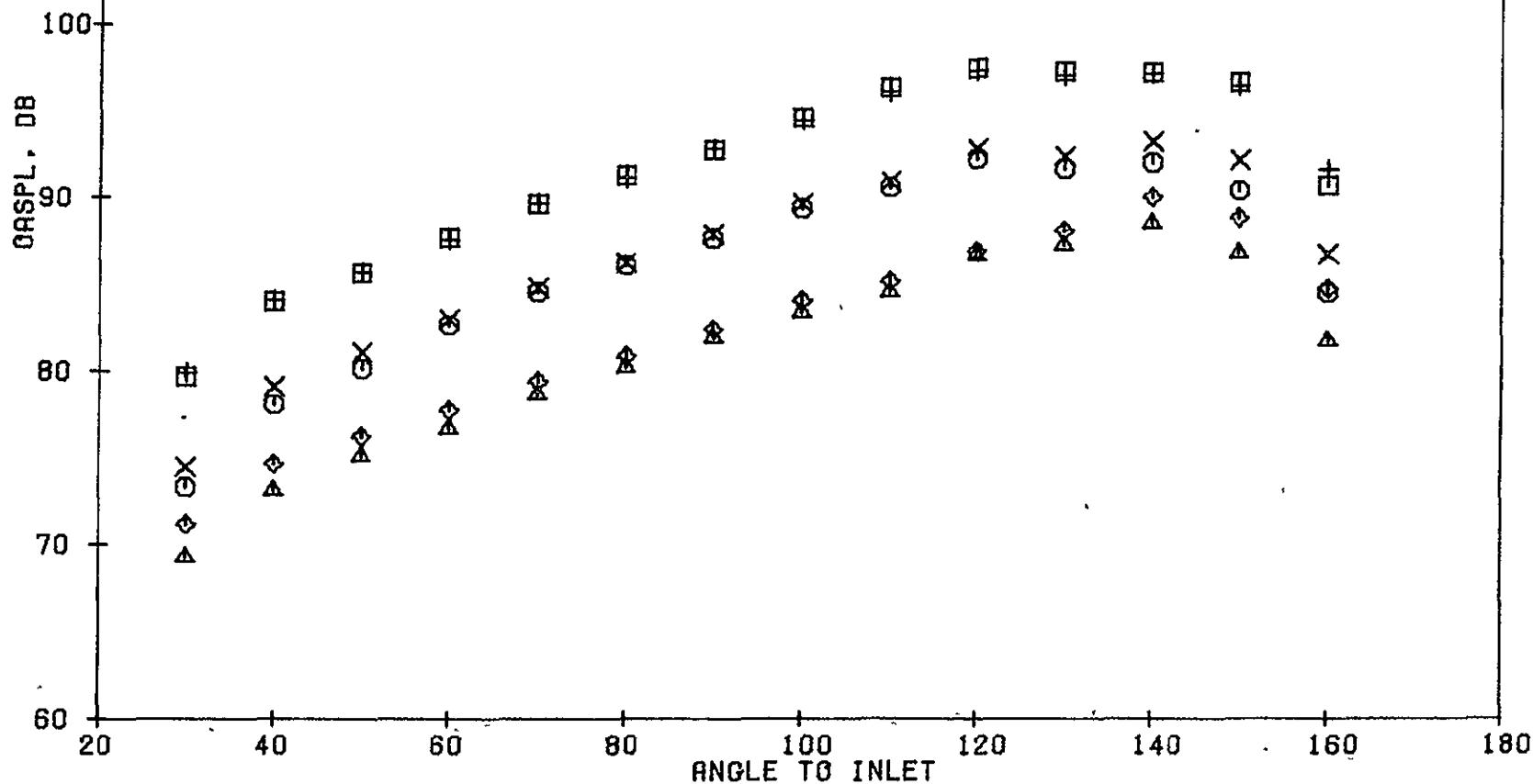
Angle to Inlet (°)	105 (DB)	103 (DB)	101 (DB)	128 (DB)
30	71	66	63	60
40	76	71	67	65
50	79	74	69	67
60	81	76	71	69
70	83	78	72	71
80	84	79	73	72
90	86	80	74	73
100	87	81	75	74
110	88	82	76	75
120	90	83	77	76
130	89	82	77	76
140	87	81	77	76
150	83	78	75	74
160	76	73	72	70

V CORE = 424 M/S } 125
V CORE = 1392 FT/S } 123
T CORE = 805 DEG K } 121
T CORE = 1449 DEG R }
V CORE = 427 M/S } 131
V CORE = 1402 FT/S } 130
T CORE = 558 DEG K } 129
T CORE = 1005 DEG R }

DBTF CONFIG. 1 OASPL VS ANGLE
VELOCITY + TEMP. EFFECT
649 M. S.L. 338 M. ALT.
2128 FT. S.L. 1110 FT. ALT.

125	□	849	2784	1093	1988
123	○	841	2103	781	1405
121	△	427	1400	523	941
131	+	850	2790	1098	1977
130	x	839	2098	777	1398
129	◇	423	1388	513	924

PT M/S FT/S °K °R
- - V Fan T Fan

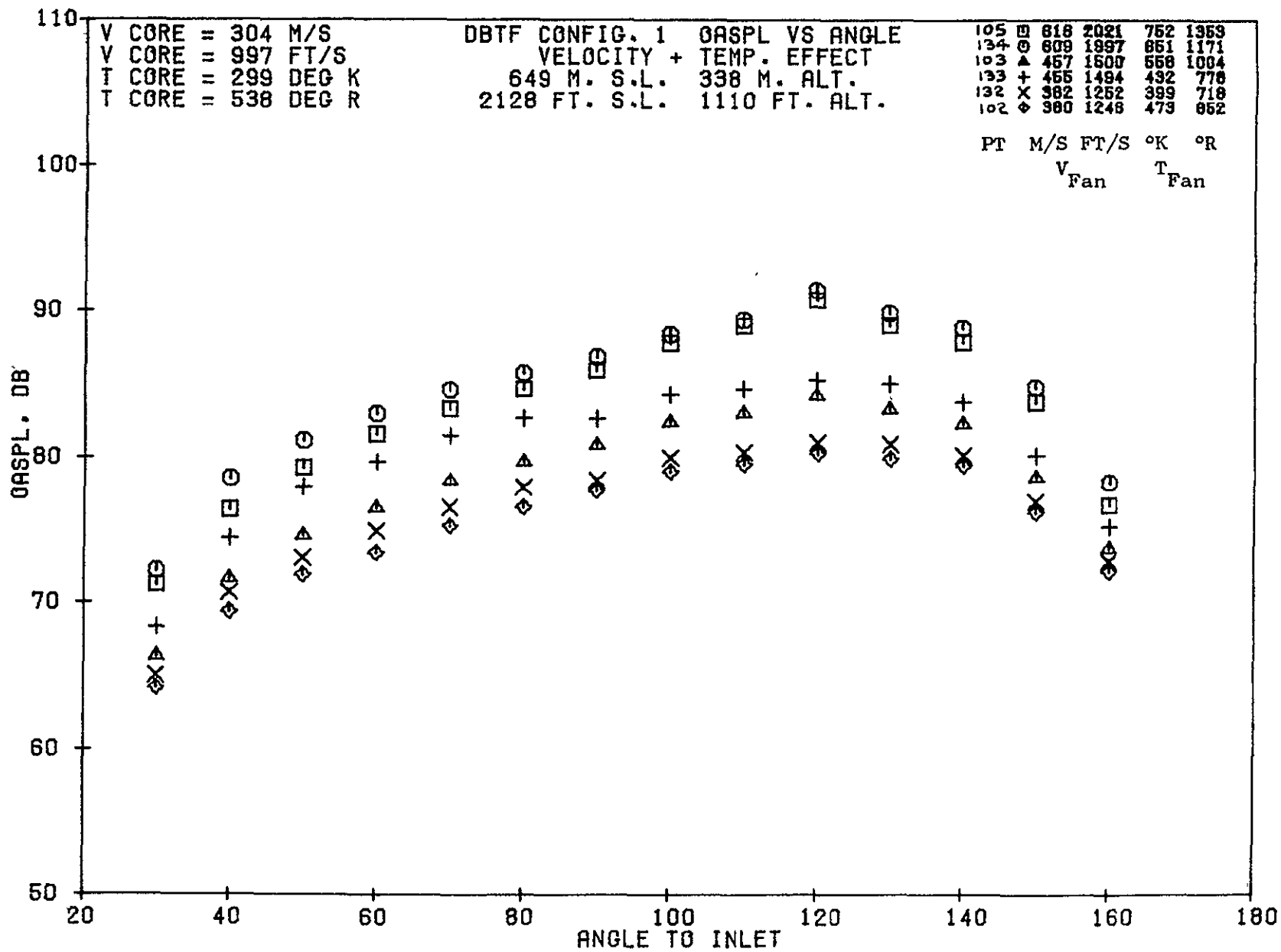


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79 BURCH A.

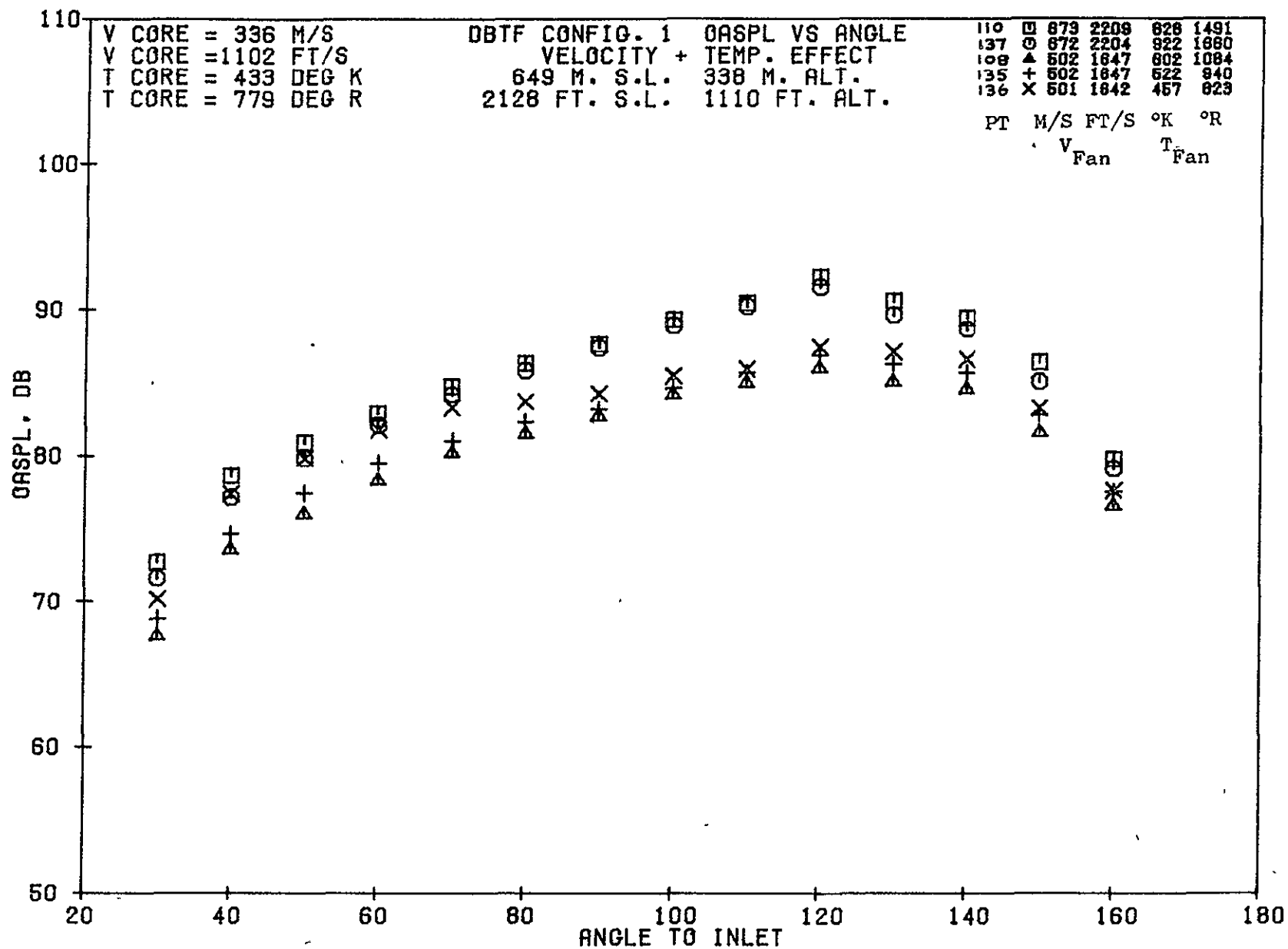
1332



4-105

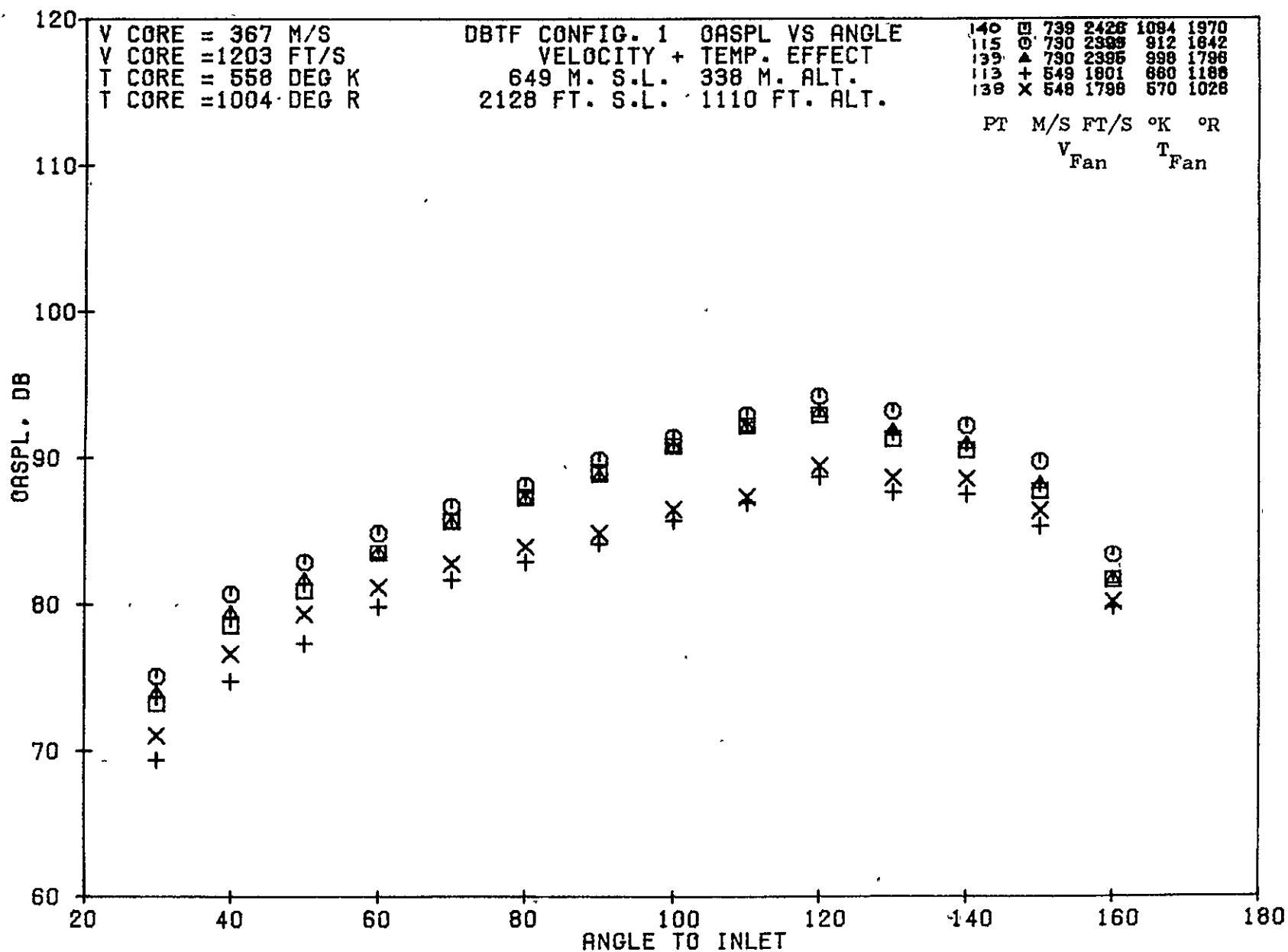
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79 BURD A.



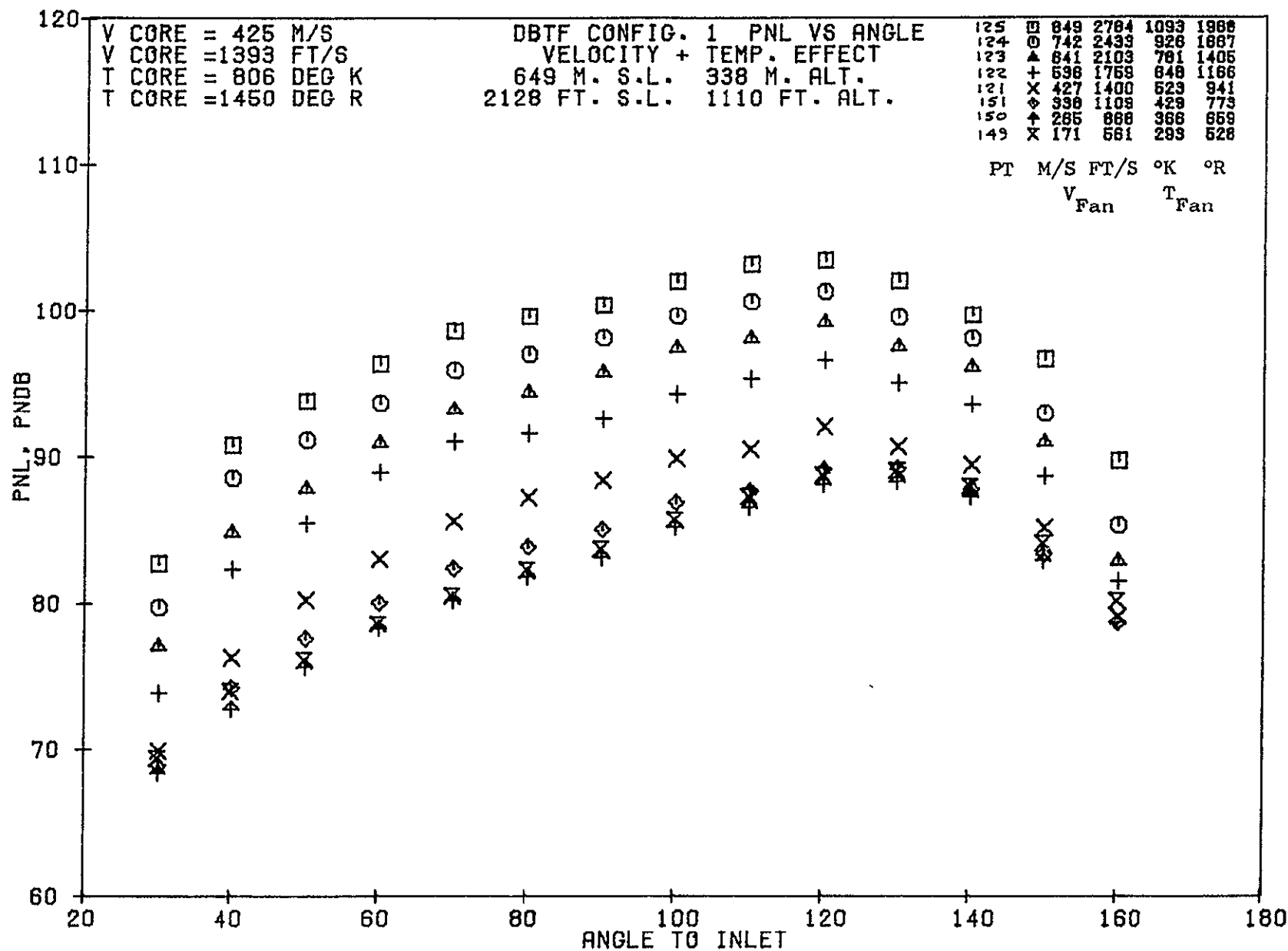
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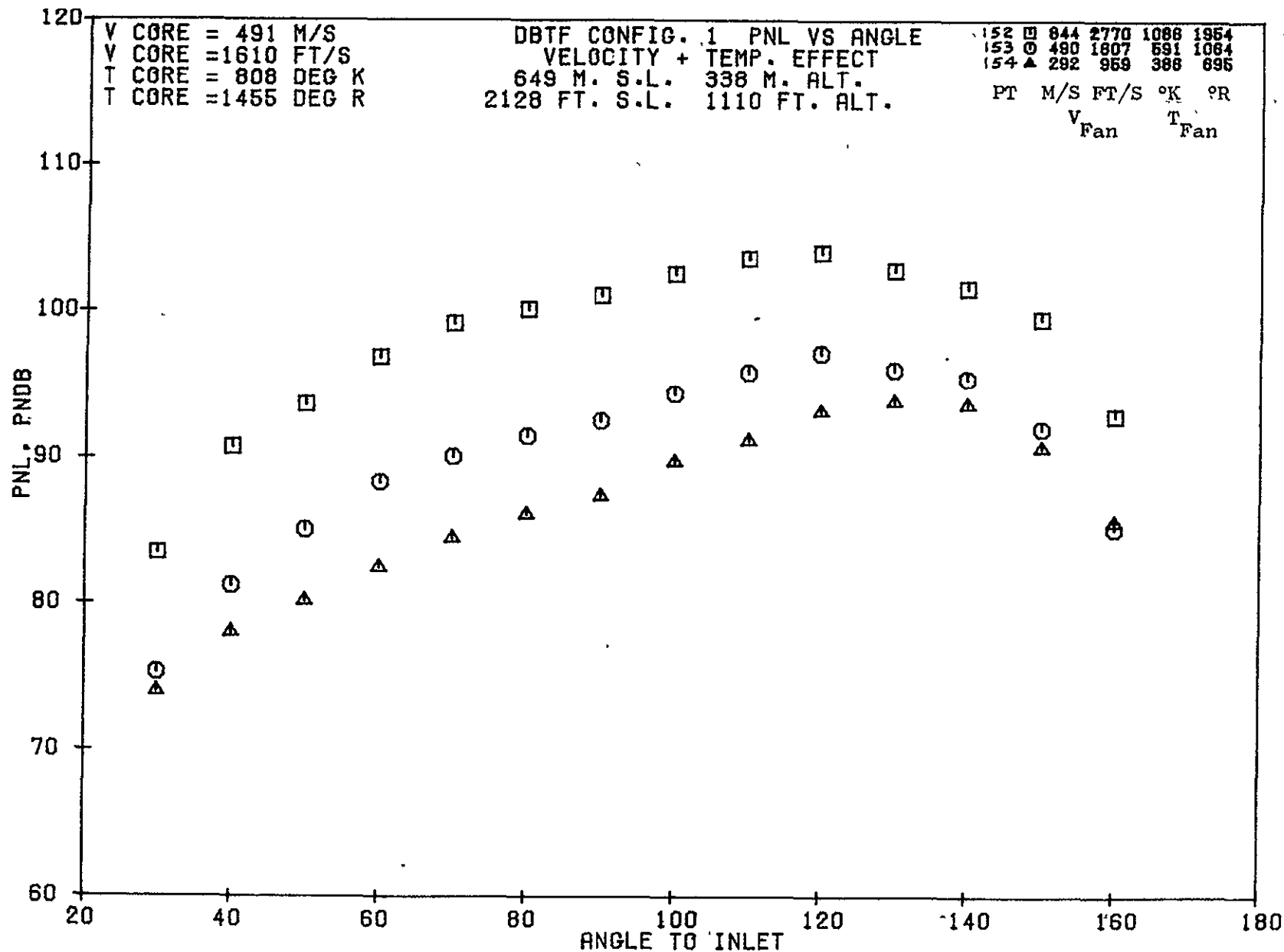
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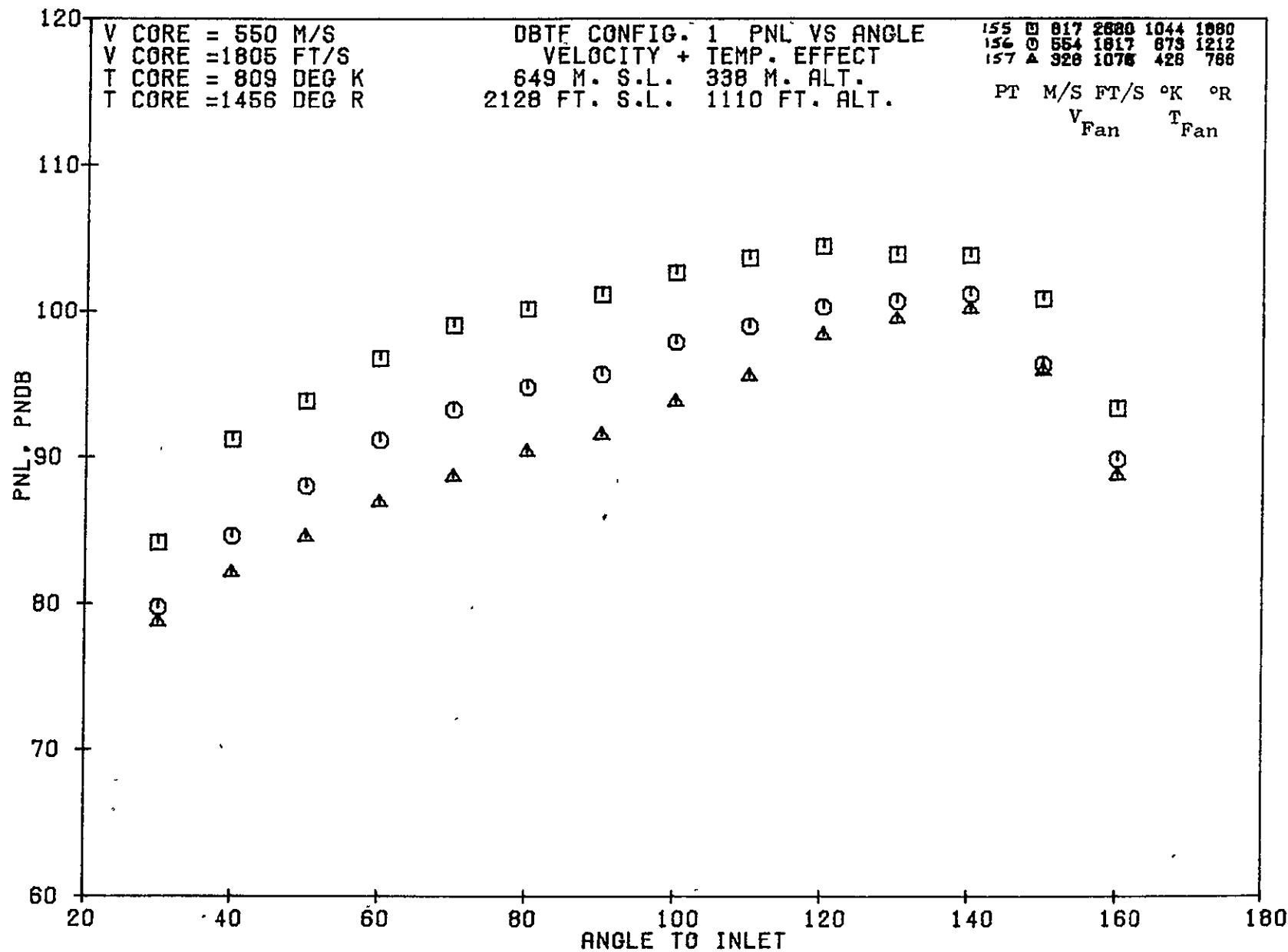
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79 BURCH A.



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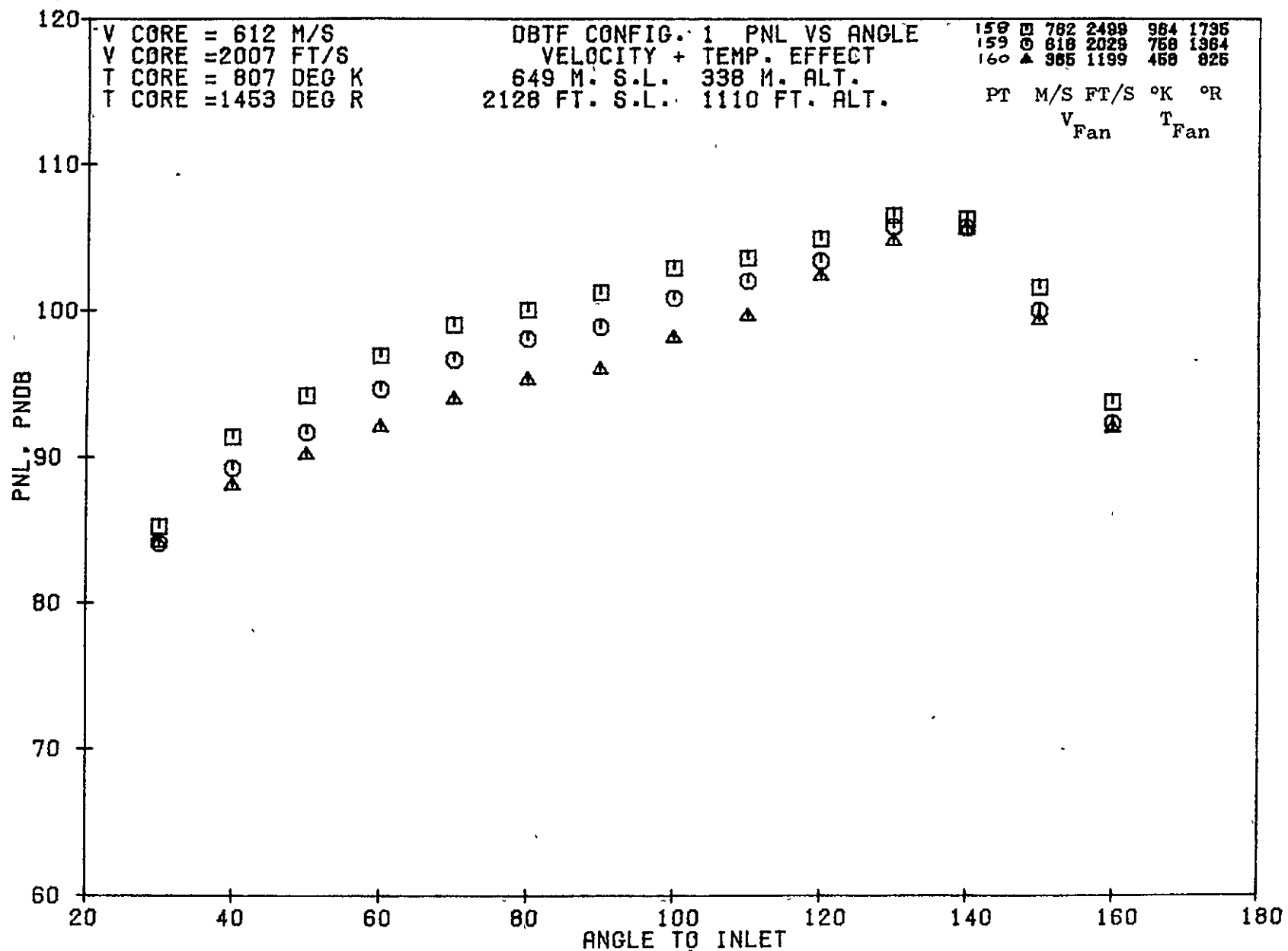
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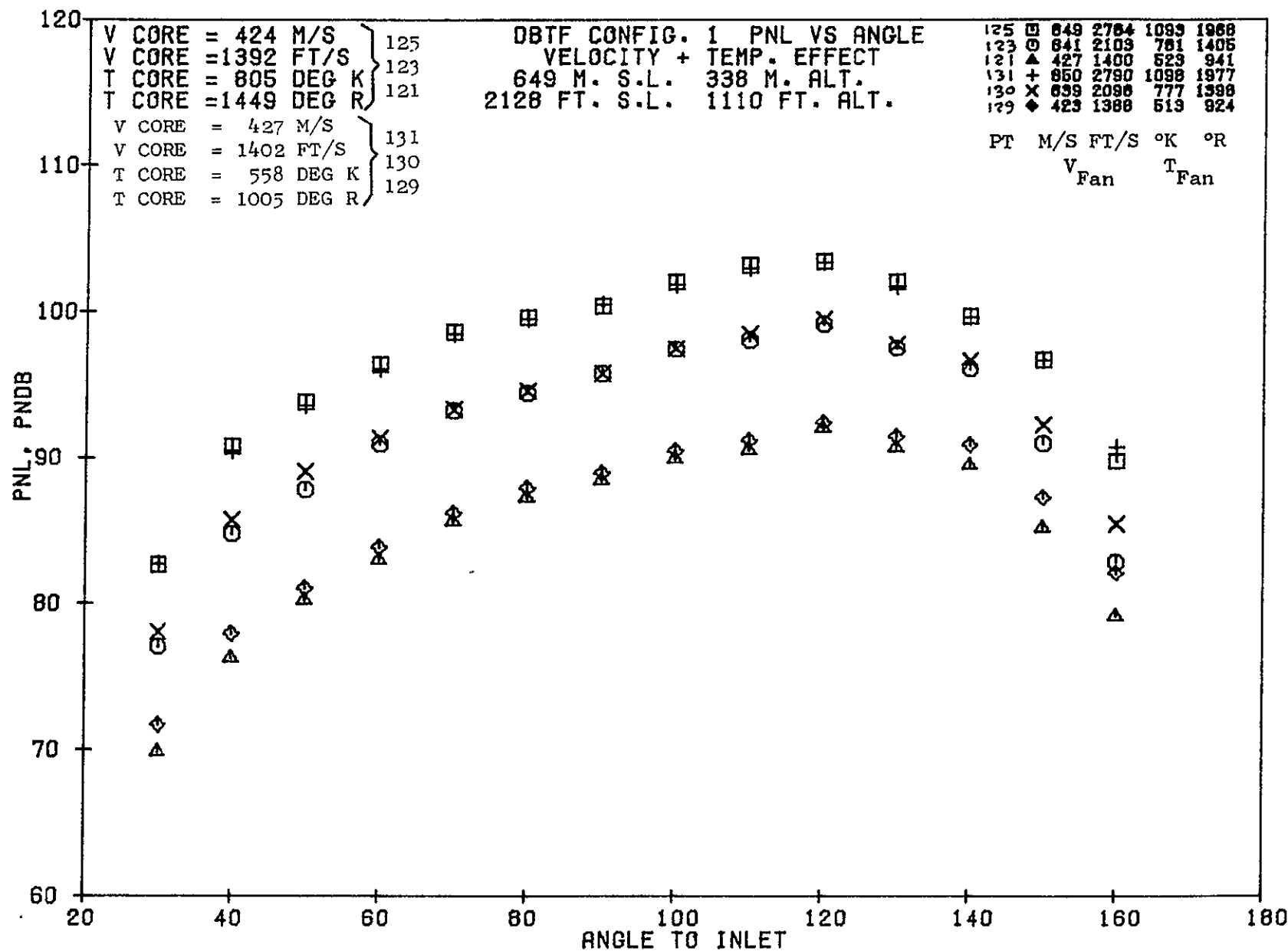
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79 BURCH A.



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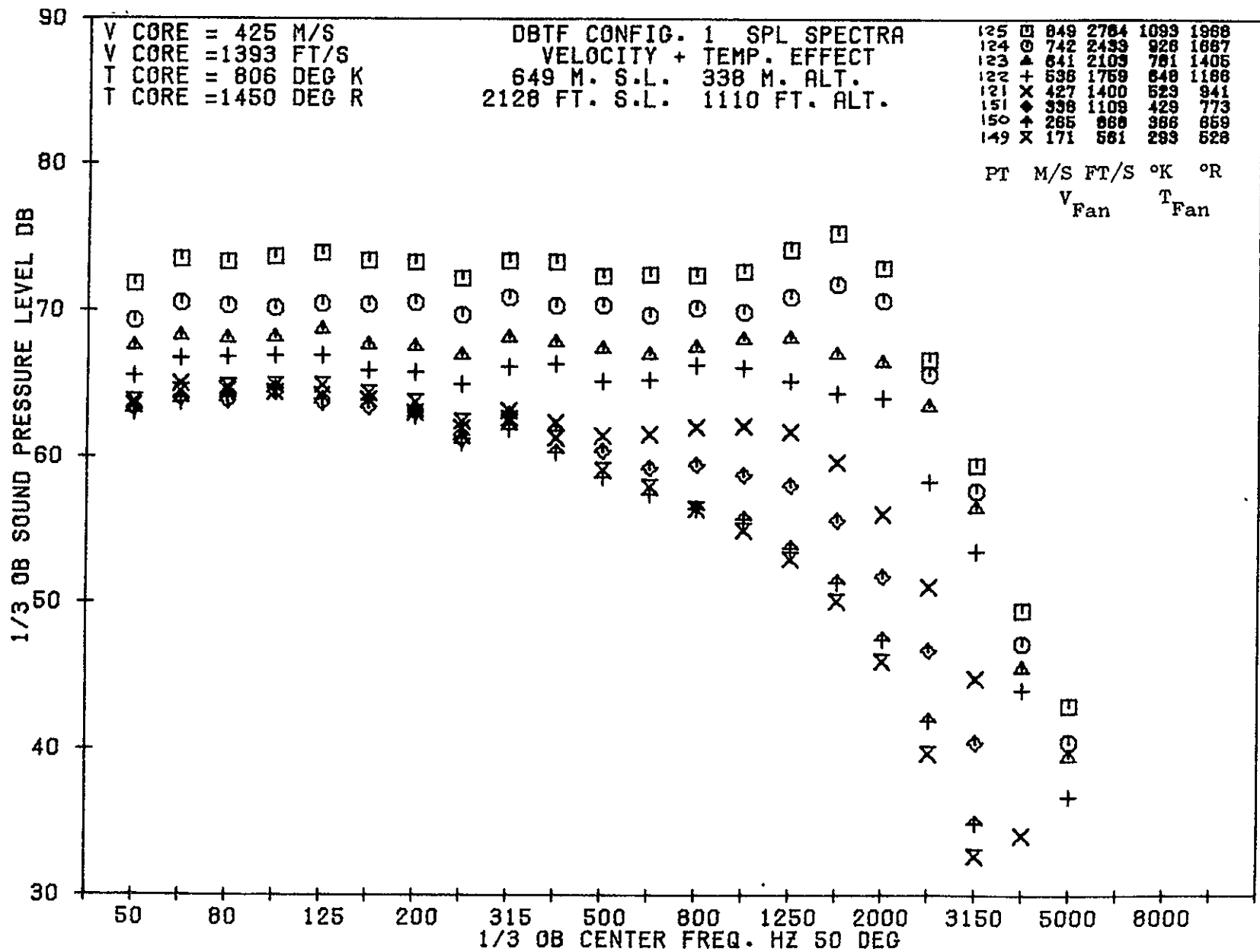
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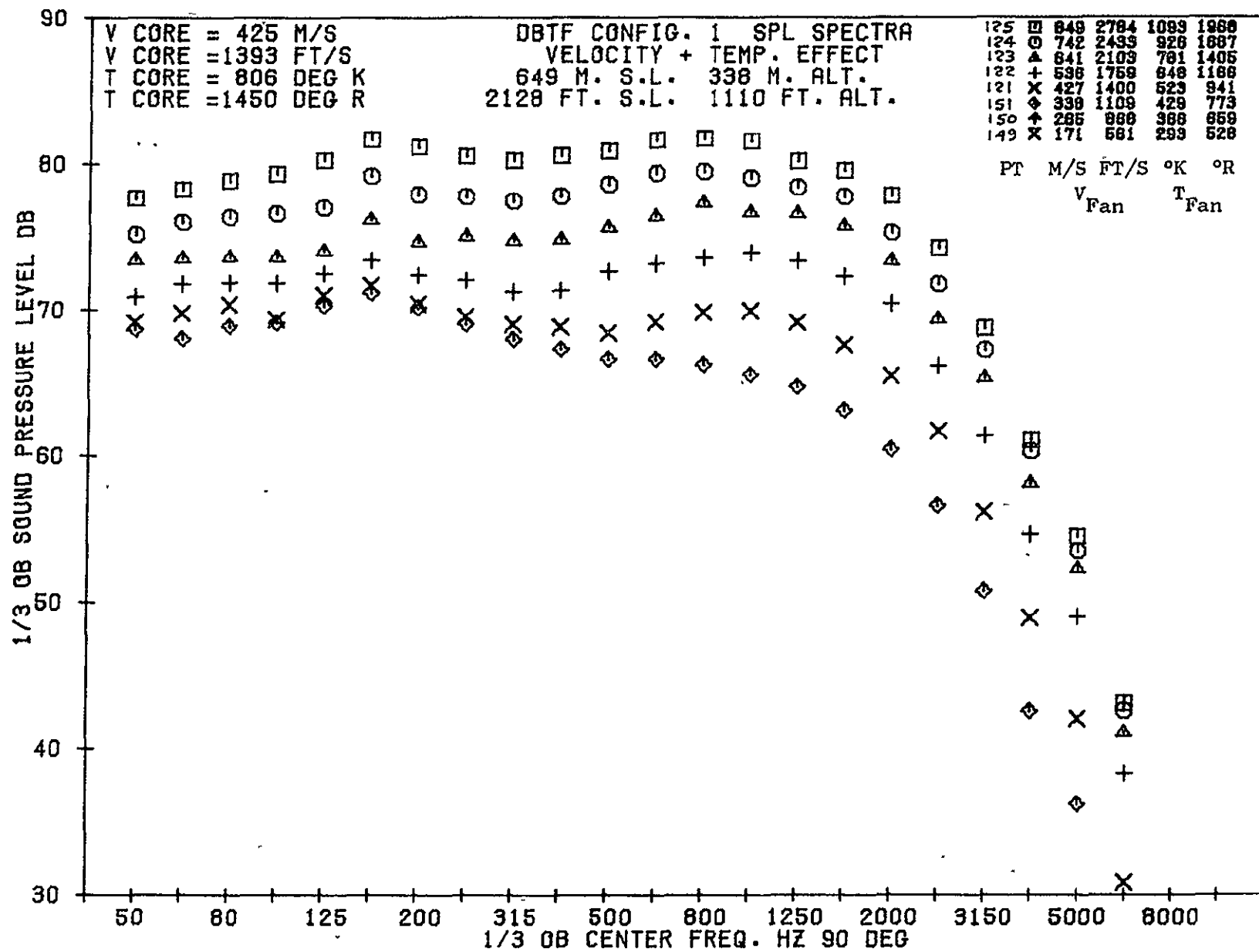
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79 BURCH A.



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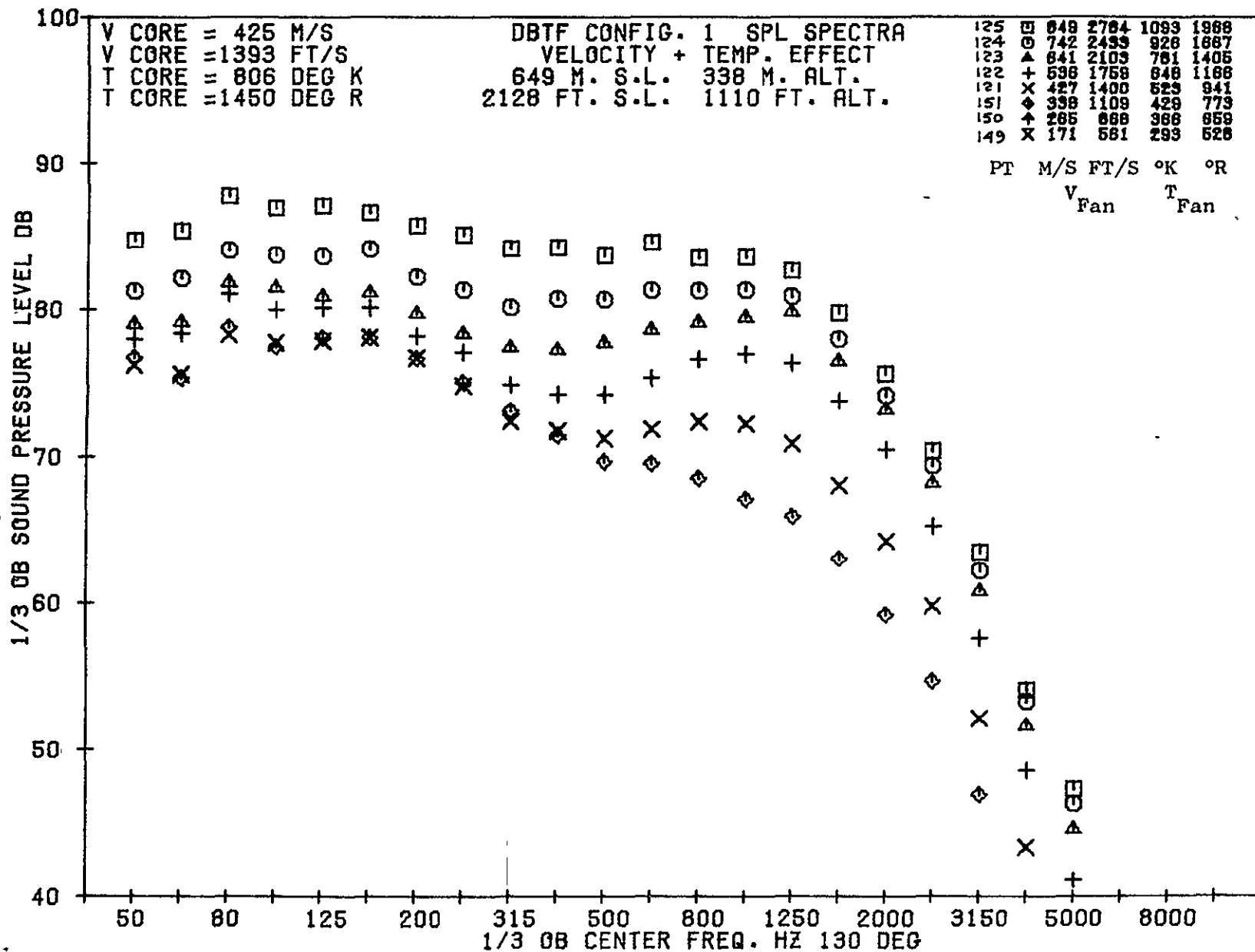
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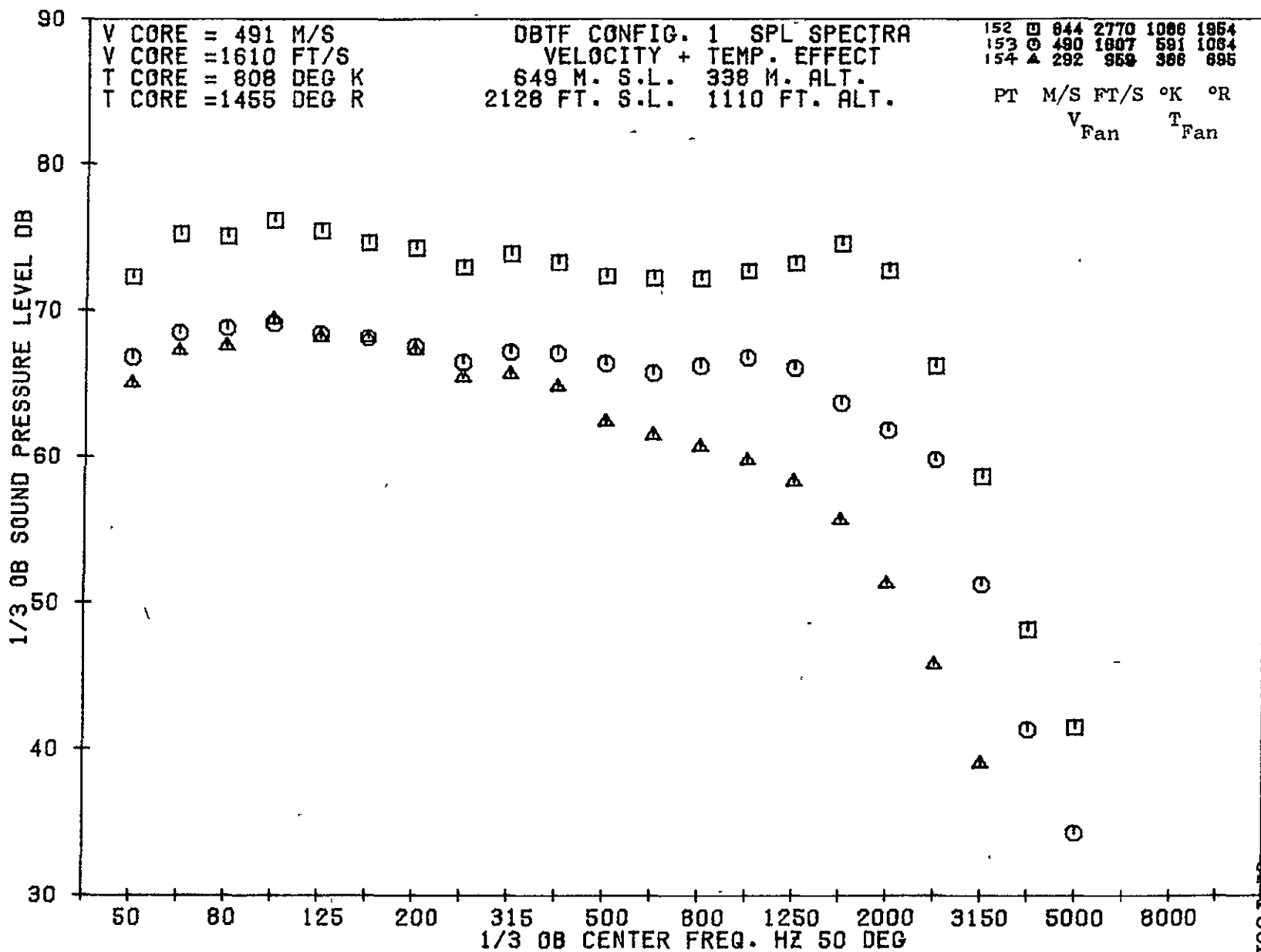
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79 BURCH A.



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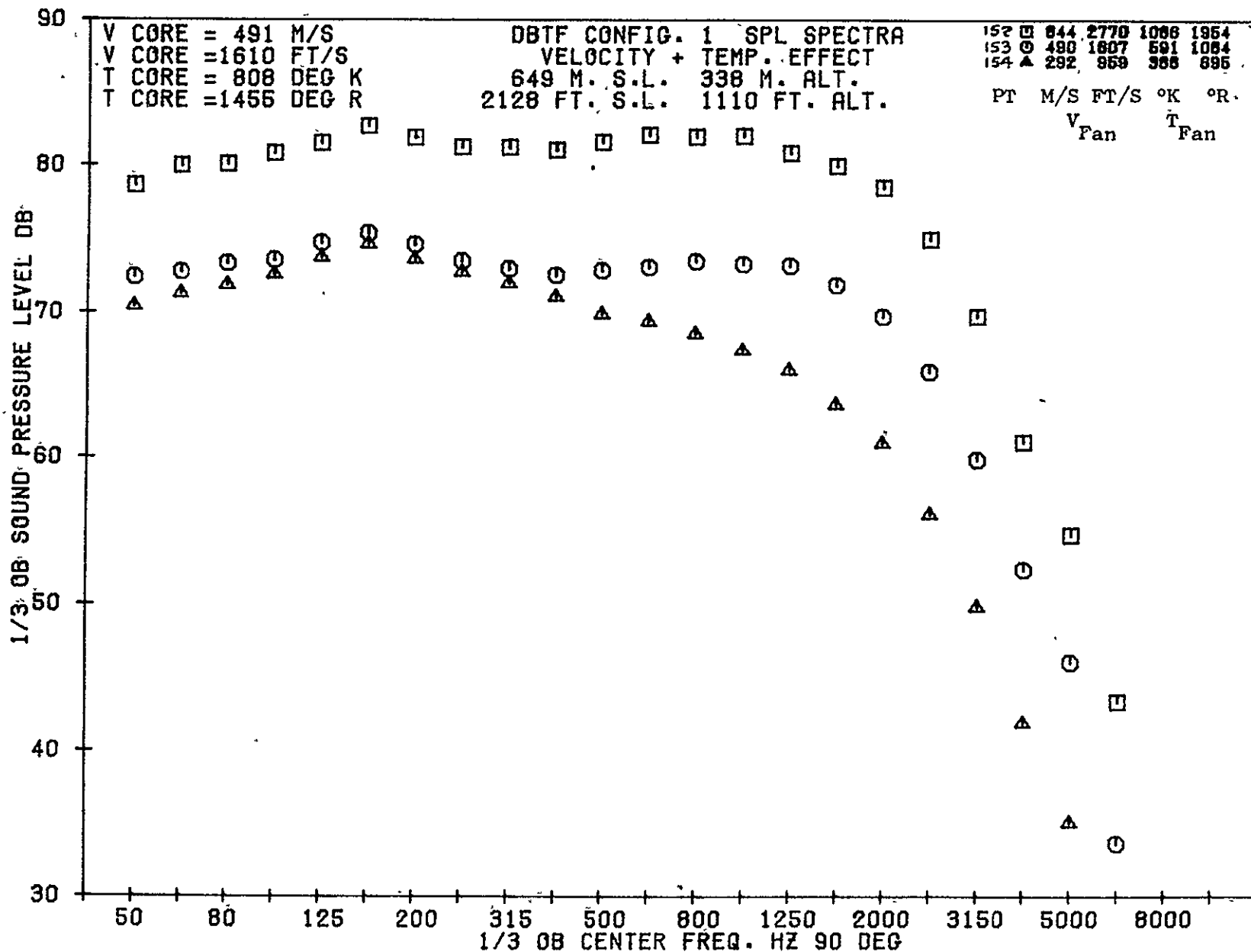
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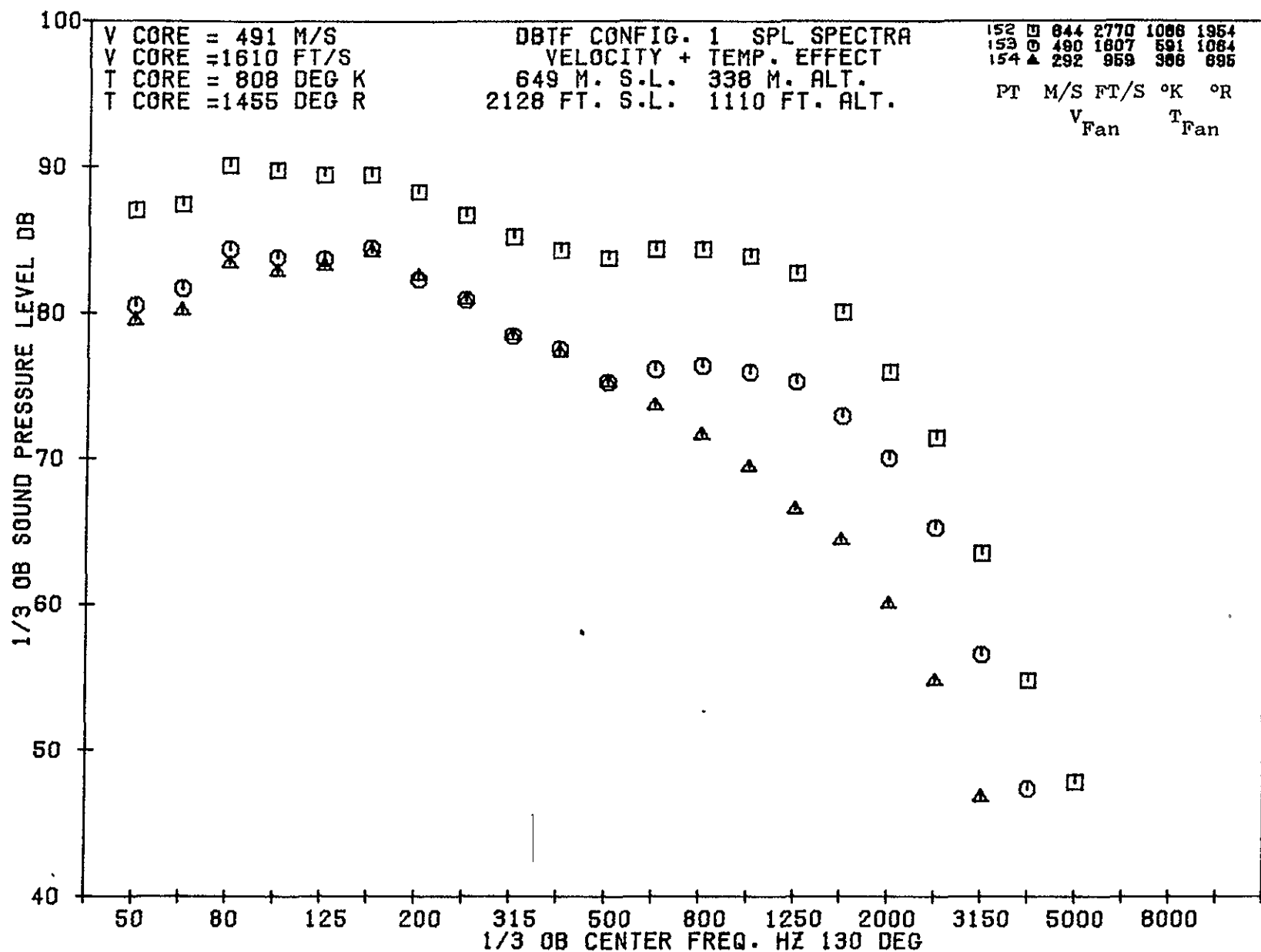
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79 BURCH A.



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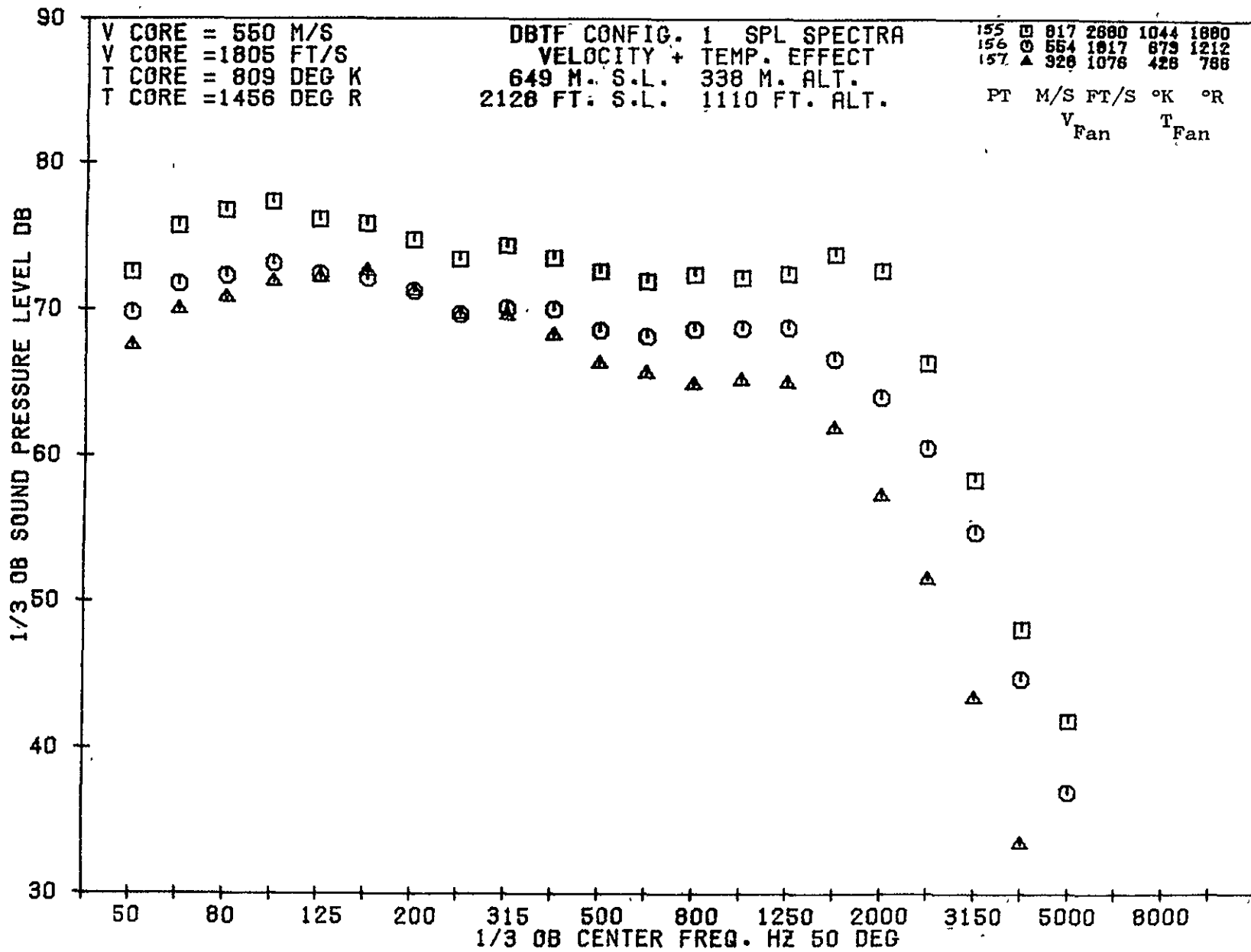
79 BURC A.



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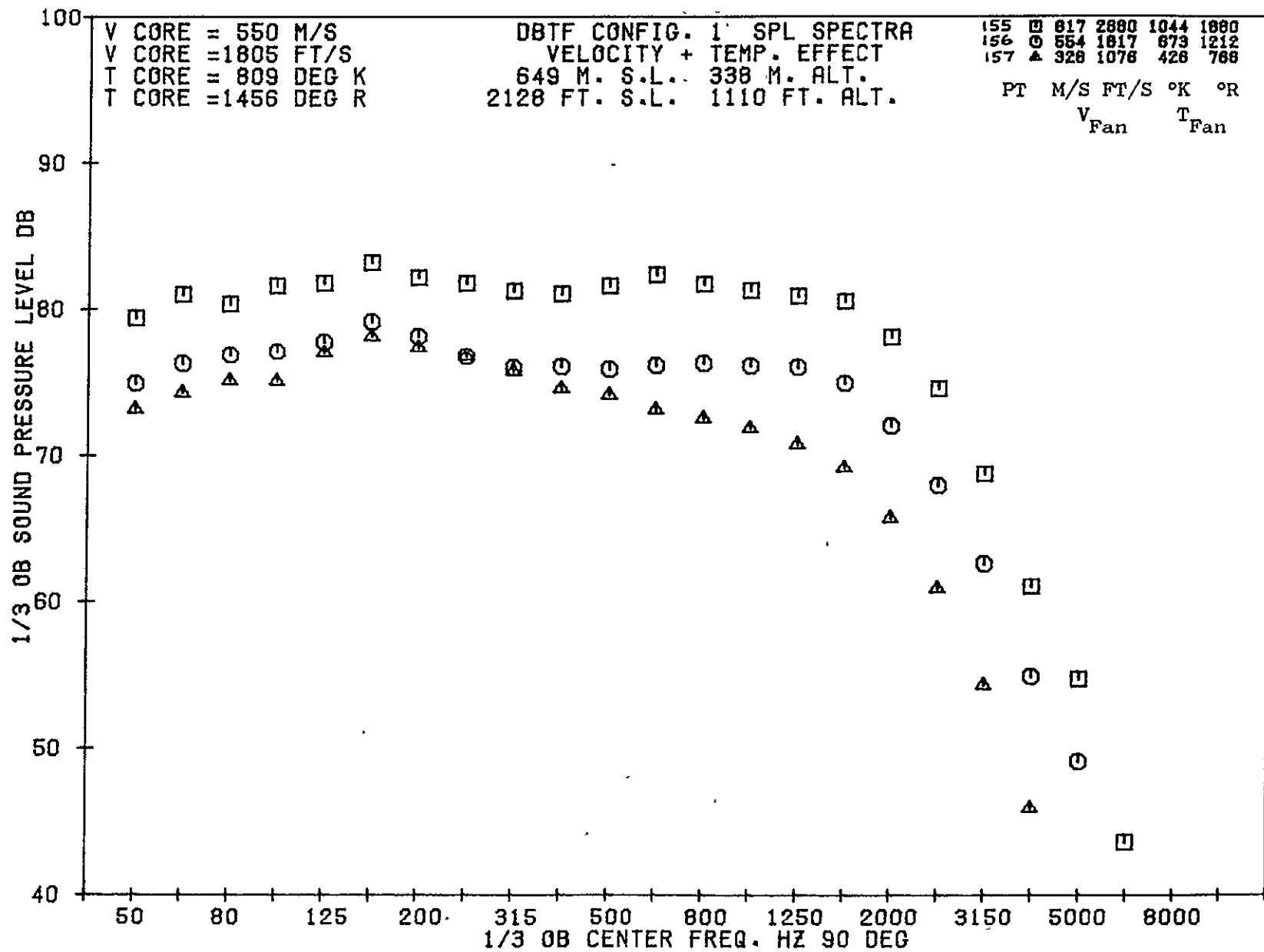
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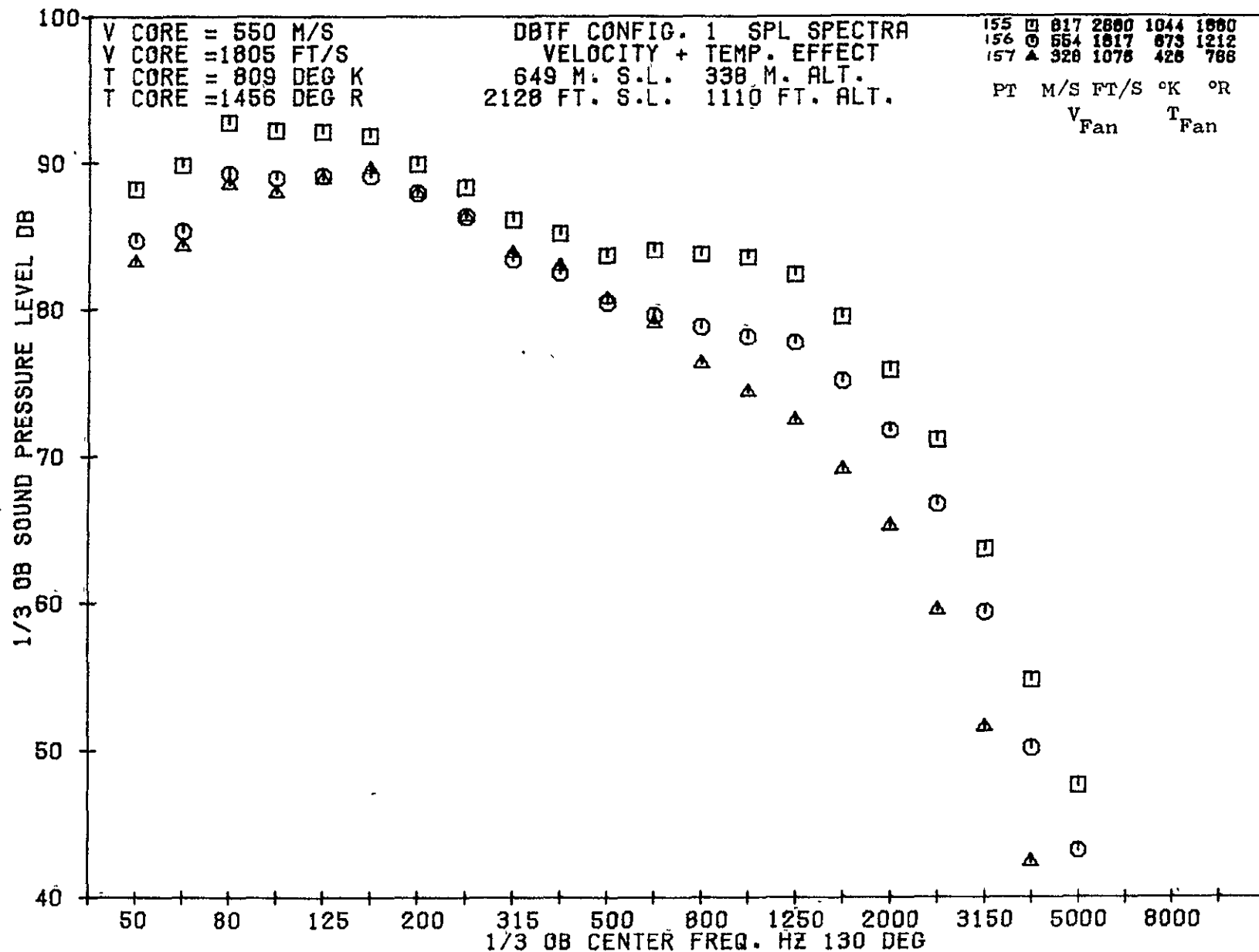
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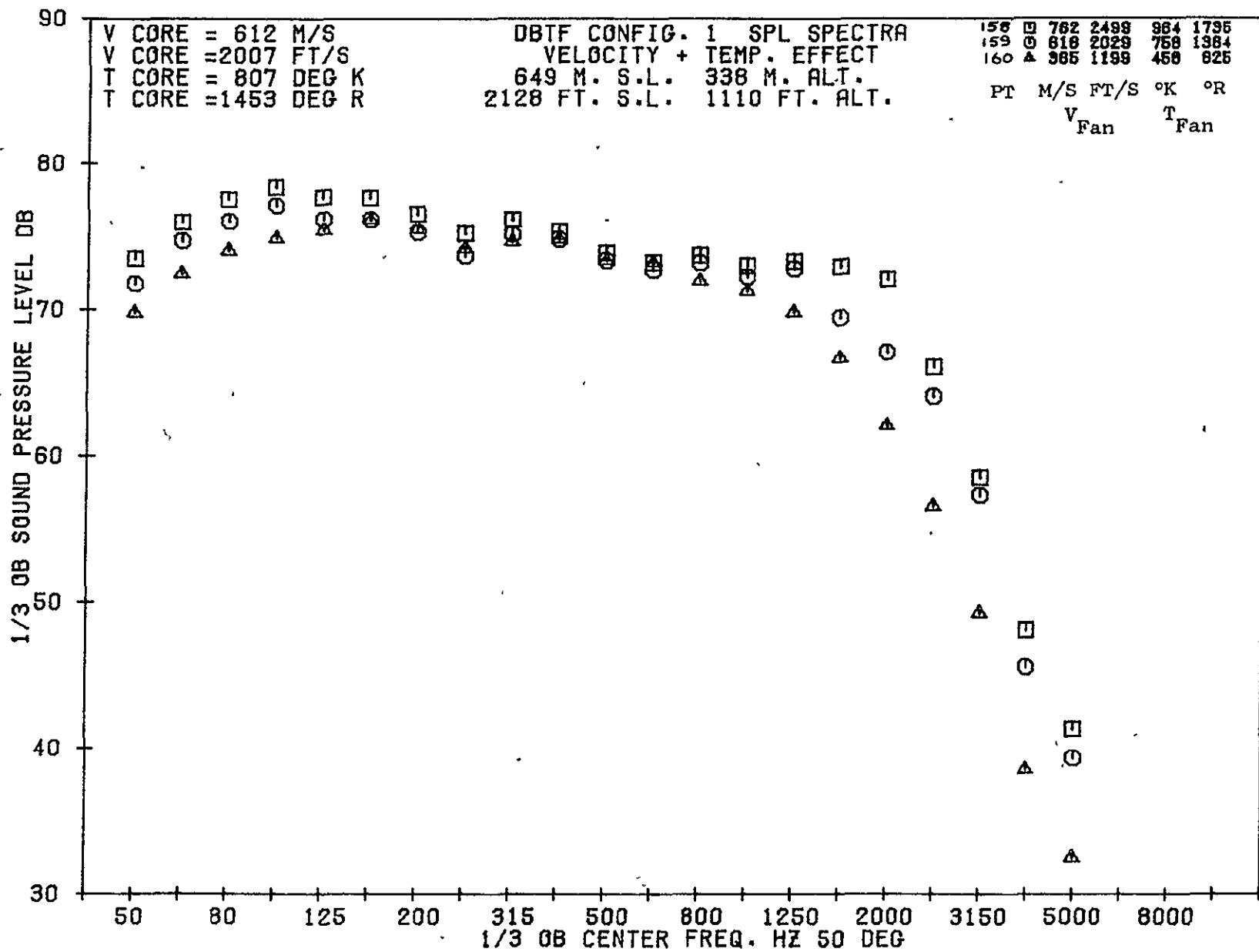
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4-120



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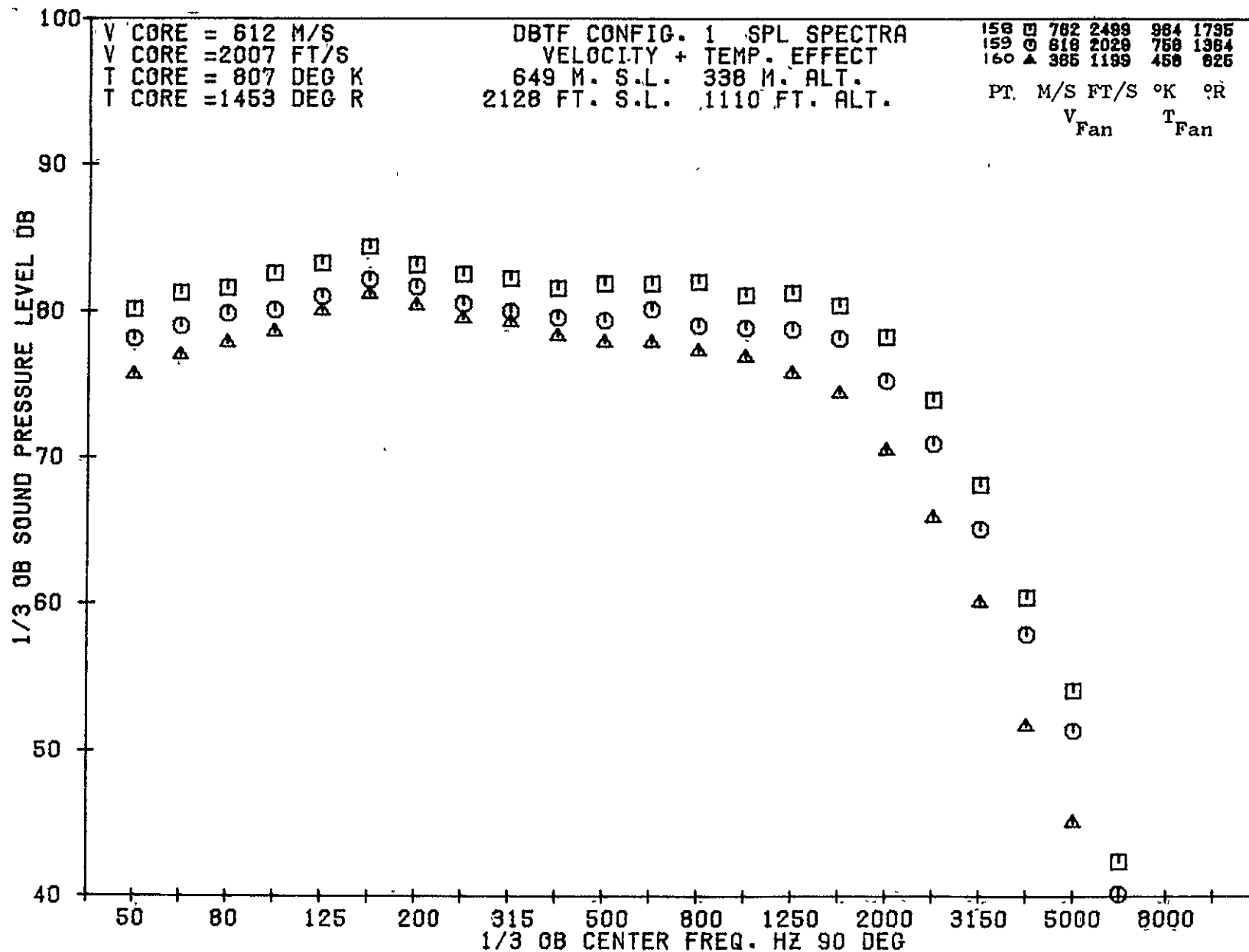
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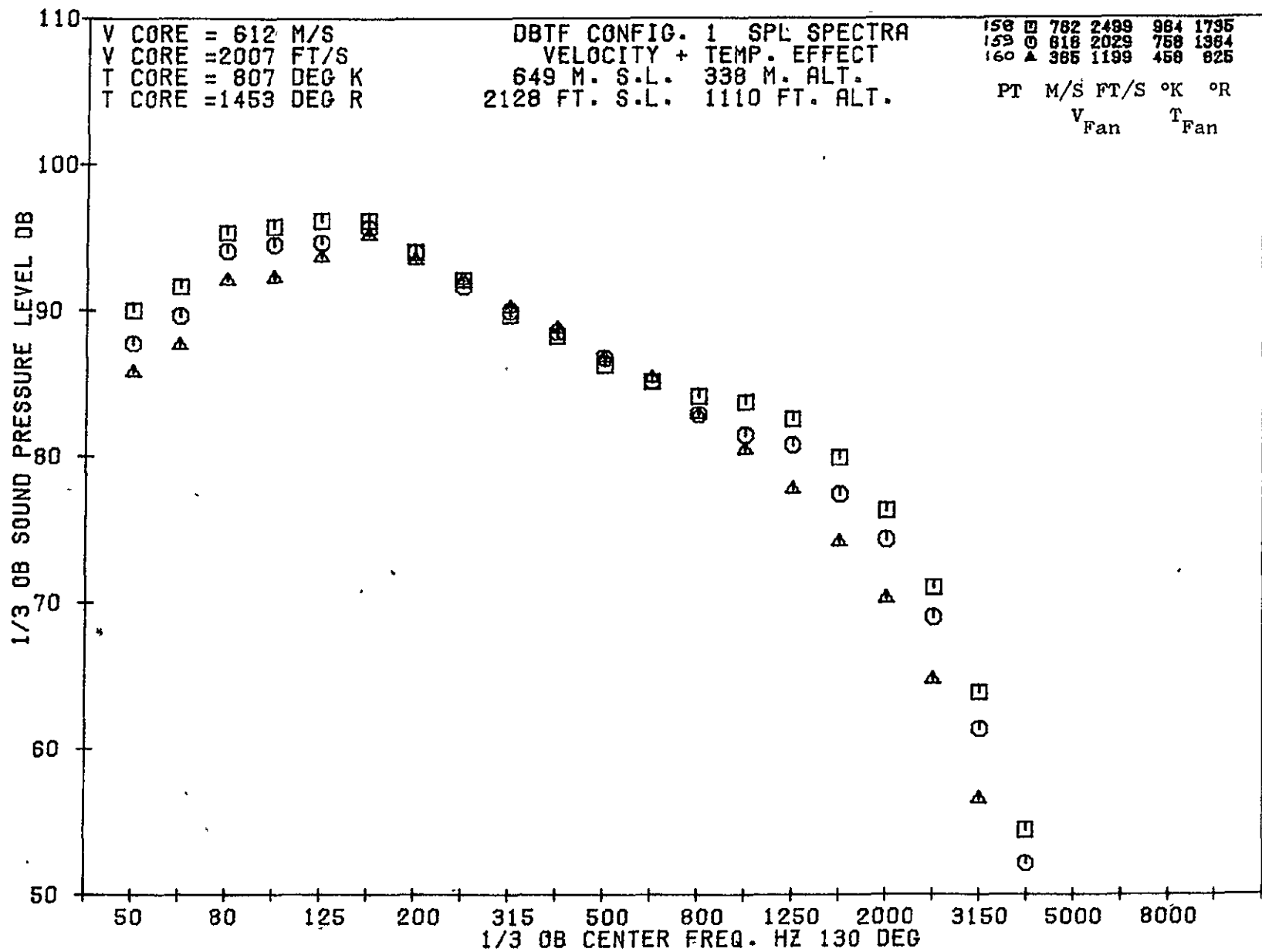
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79 BURCH A.



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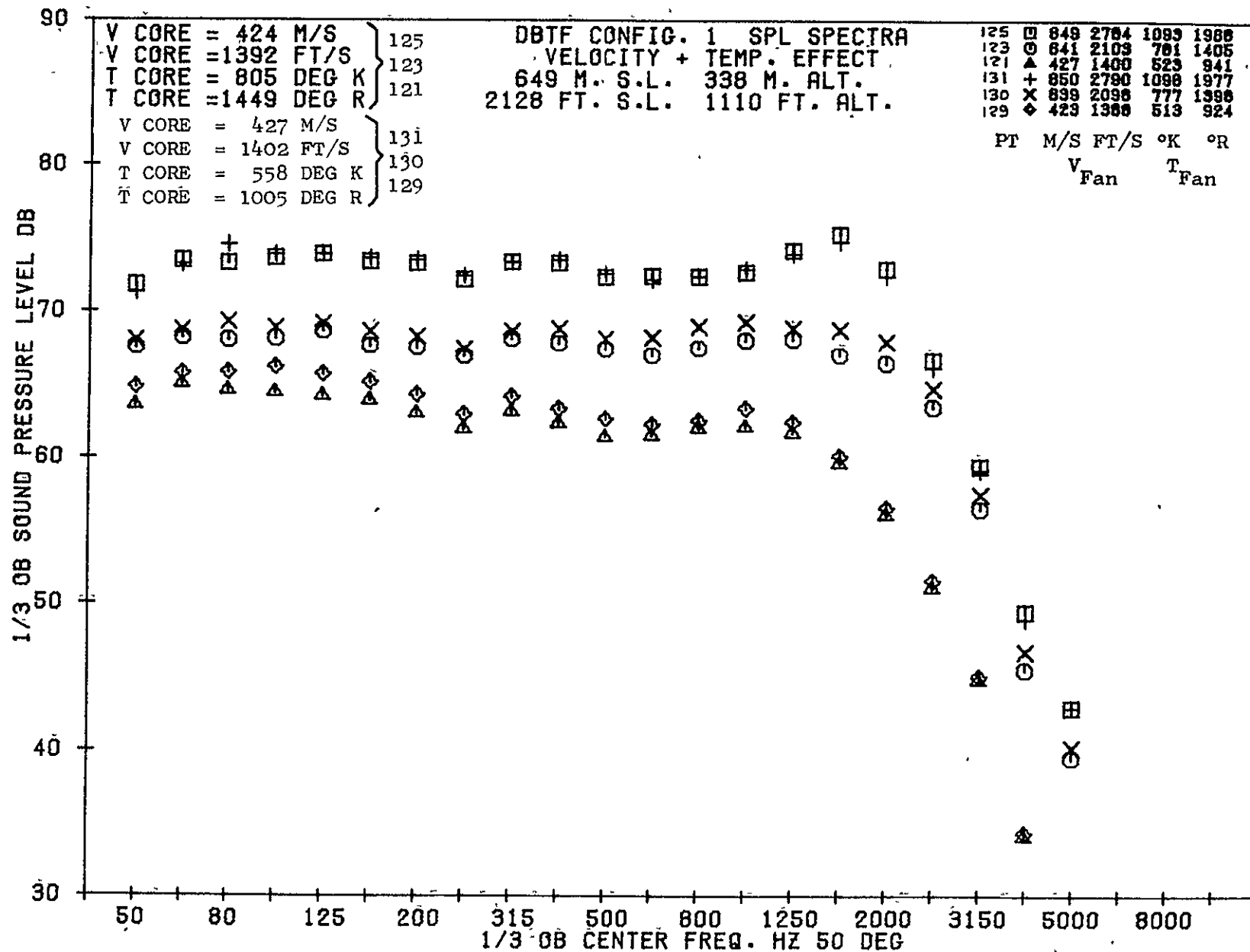
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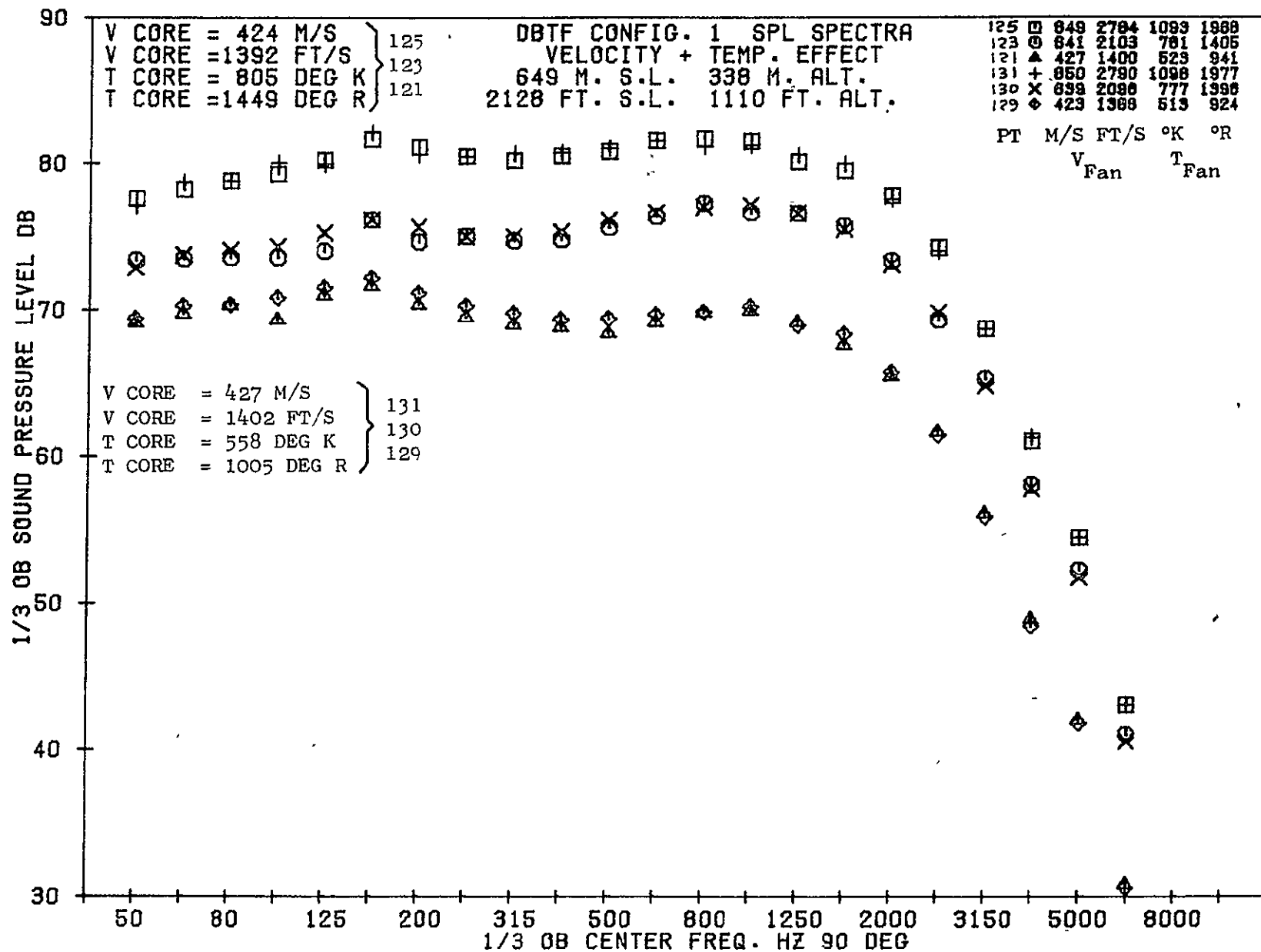
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79 BURCH A.



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79 BURCH

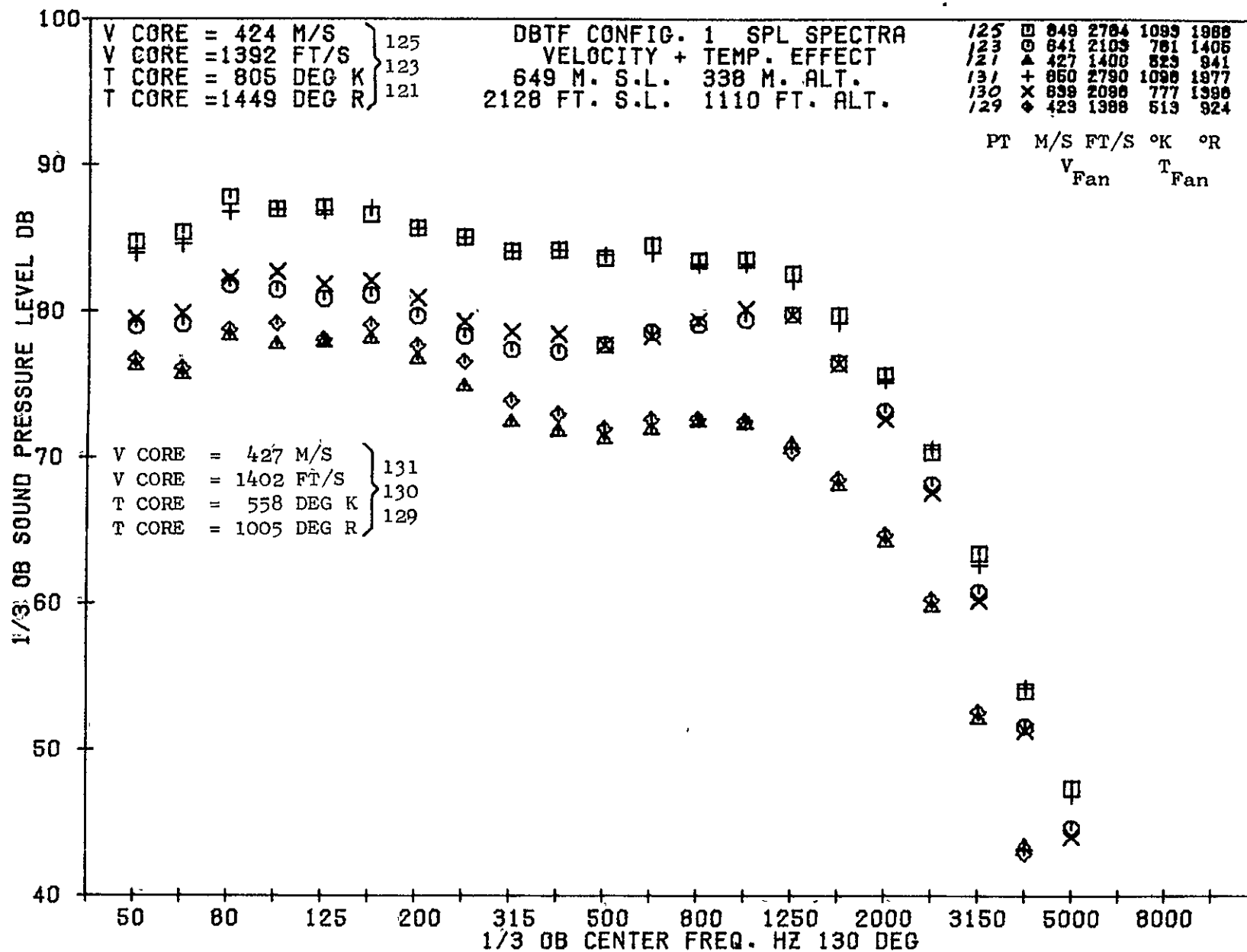


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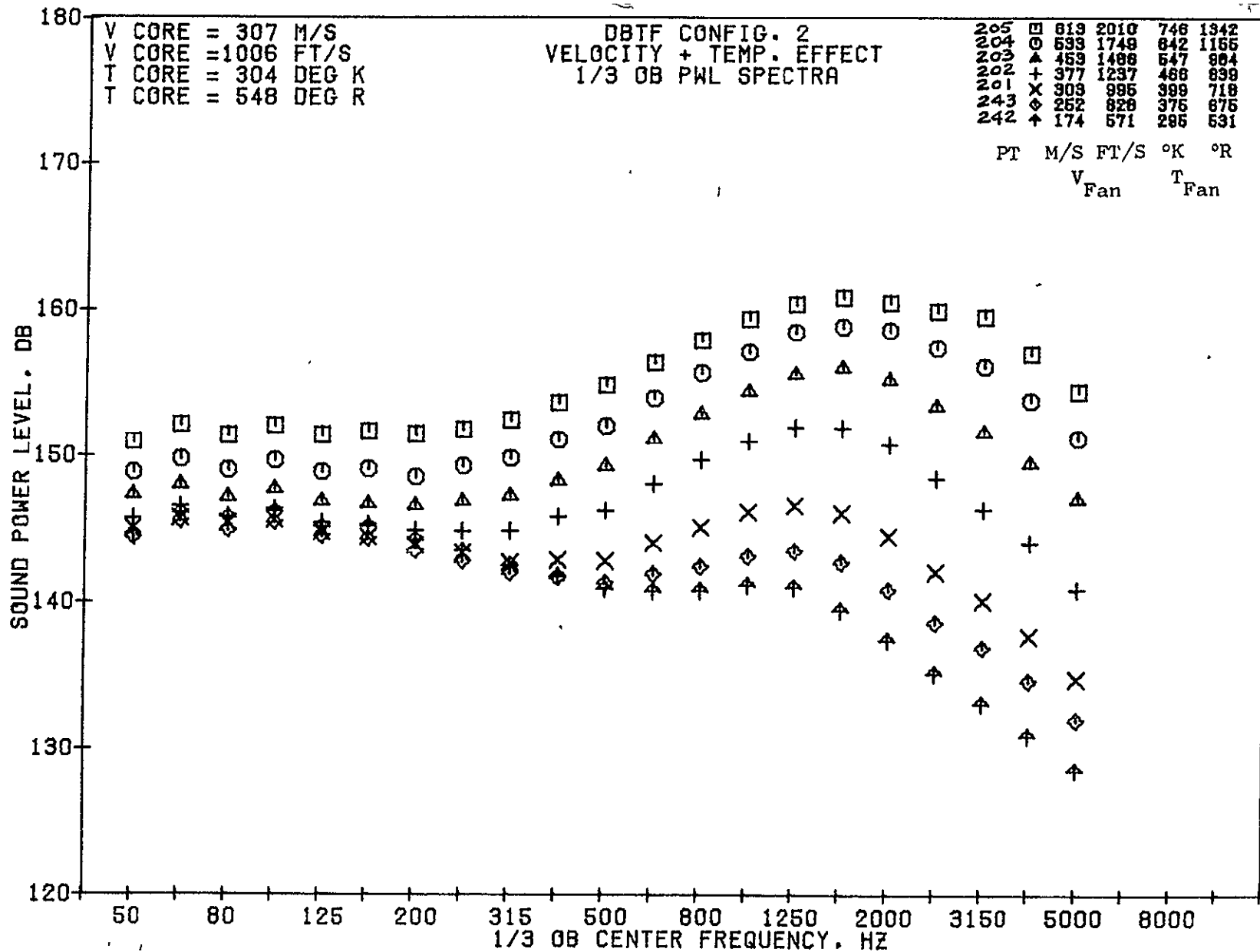
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79 BURCH 'A.

1354

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79 BURCH A.

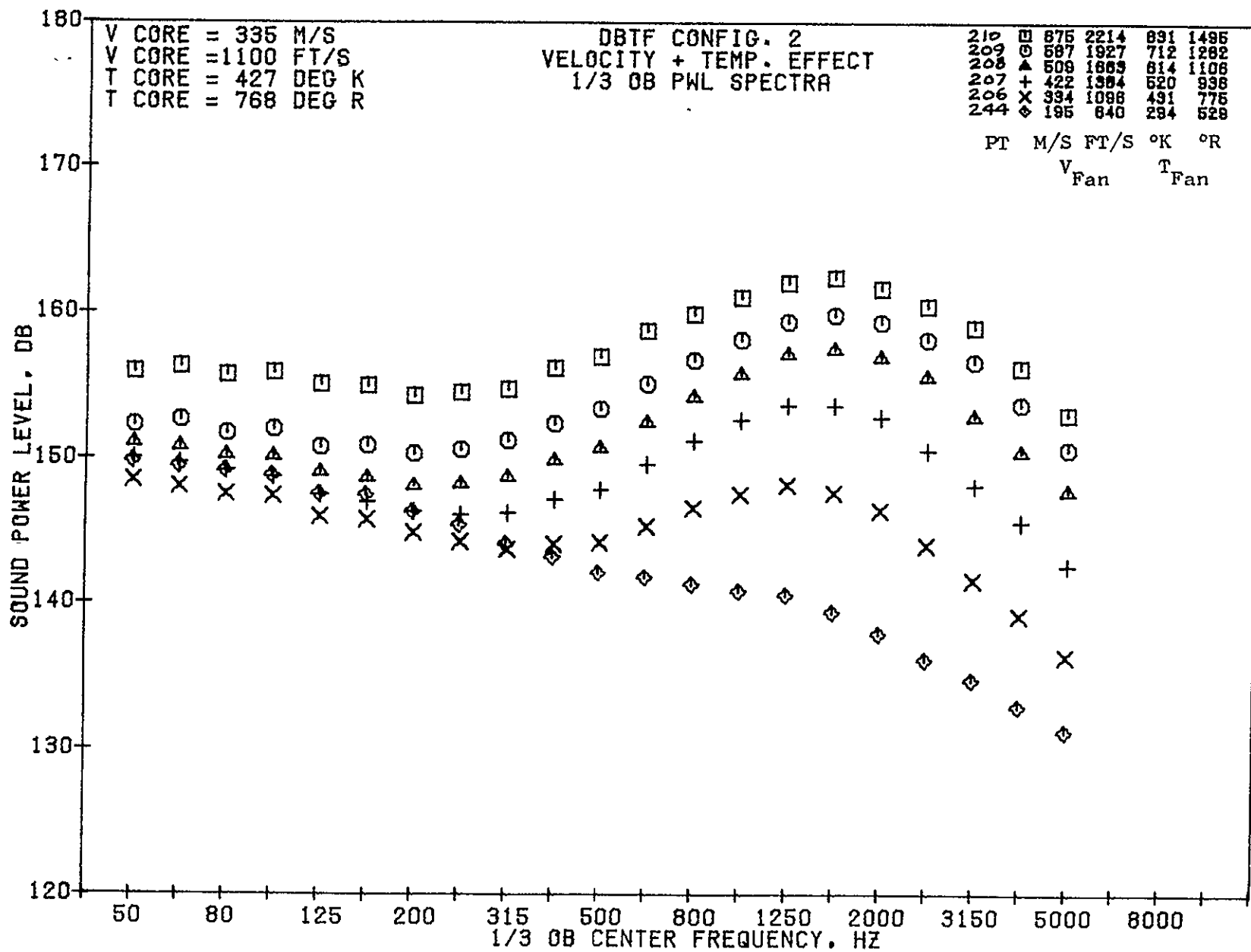


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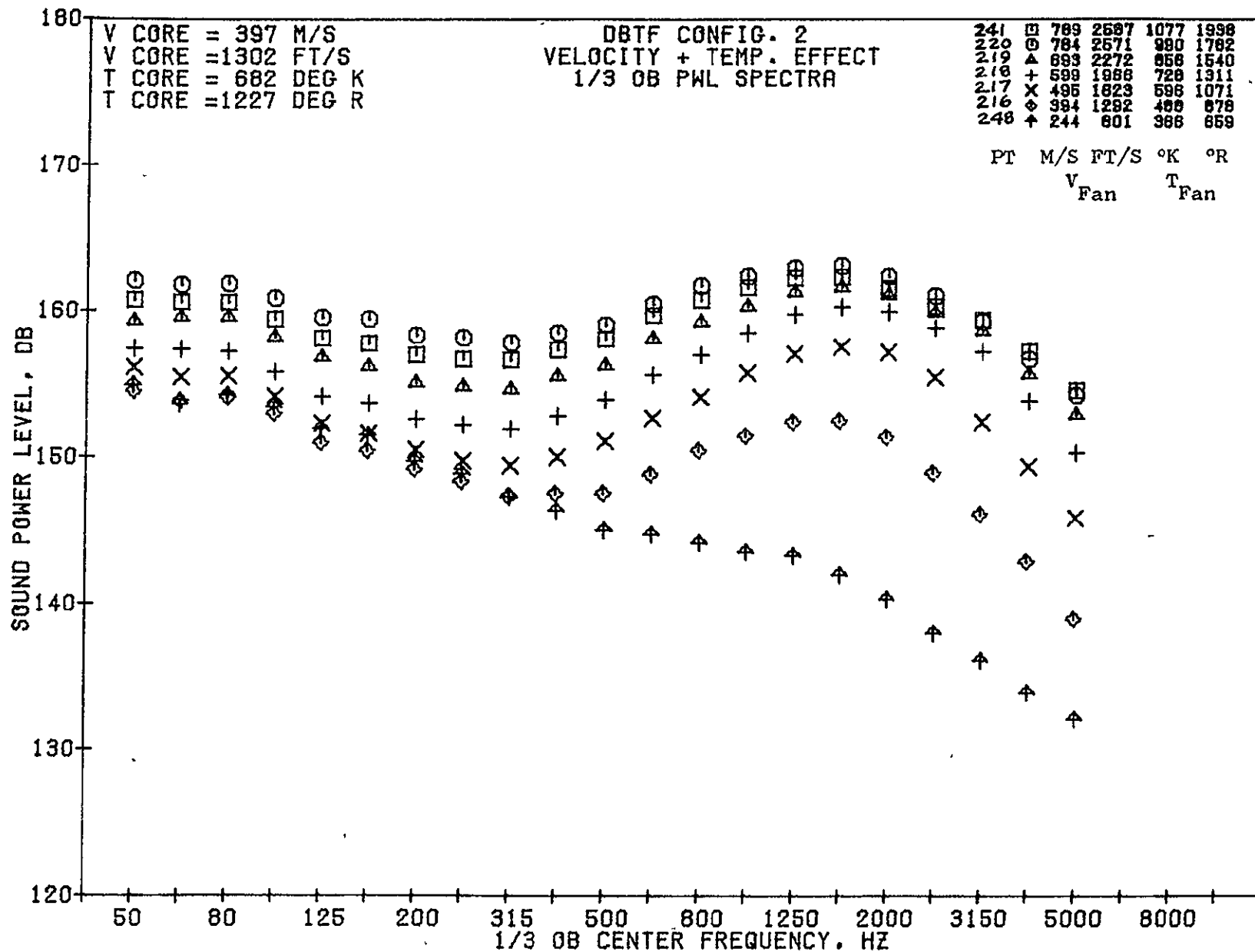
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1356



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5R266-001

79 BURCH-9.

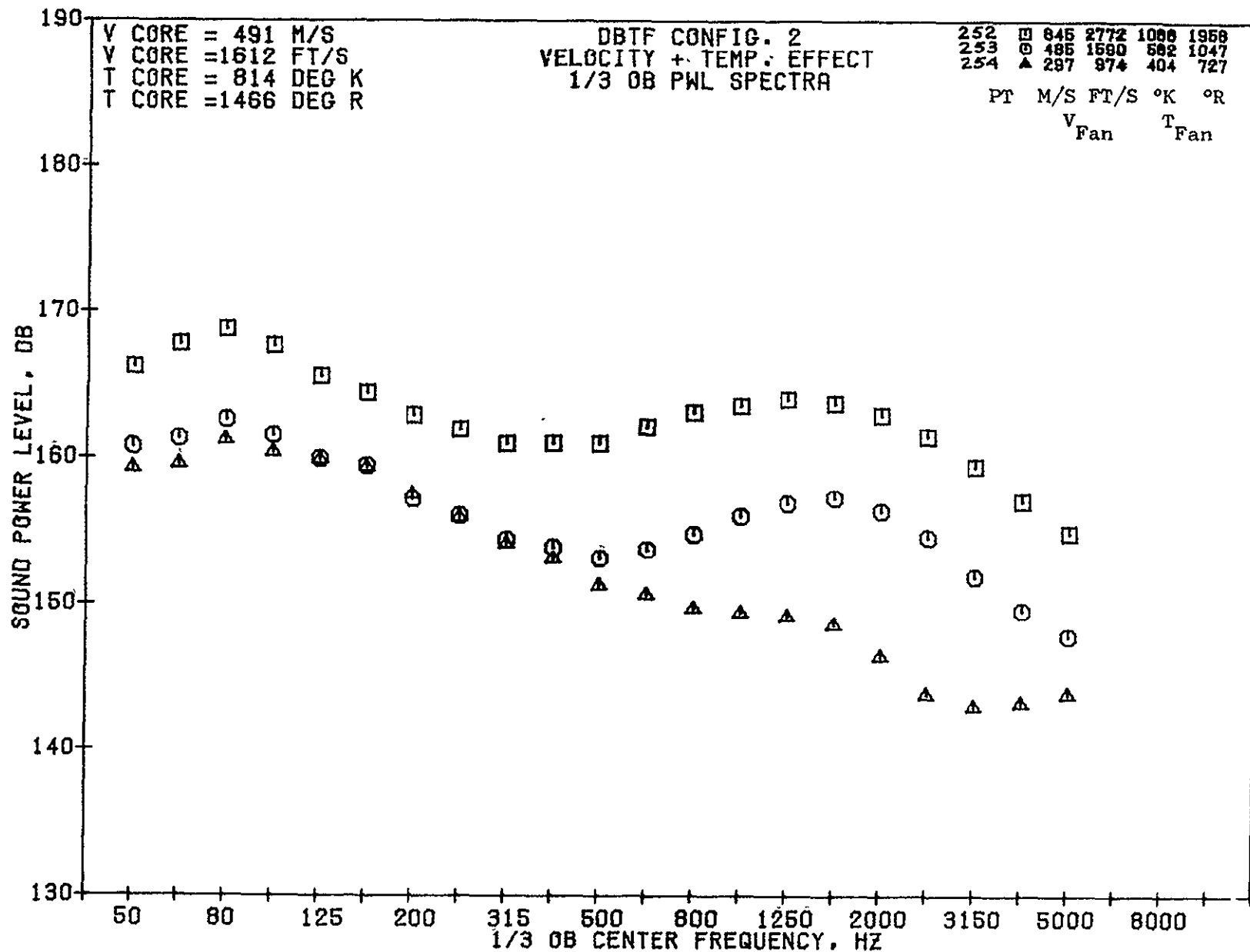


1357

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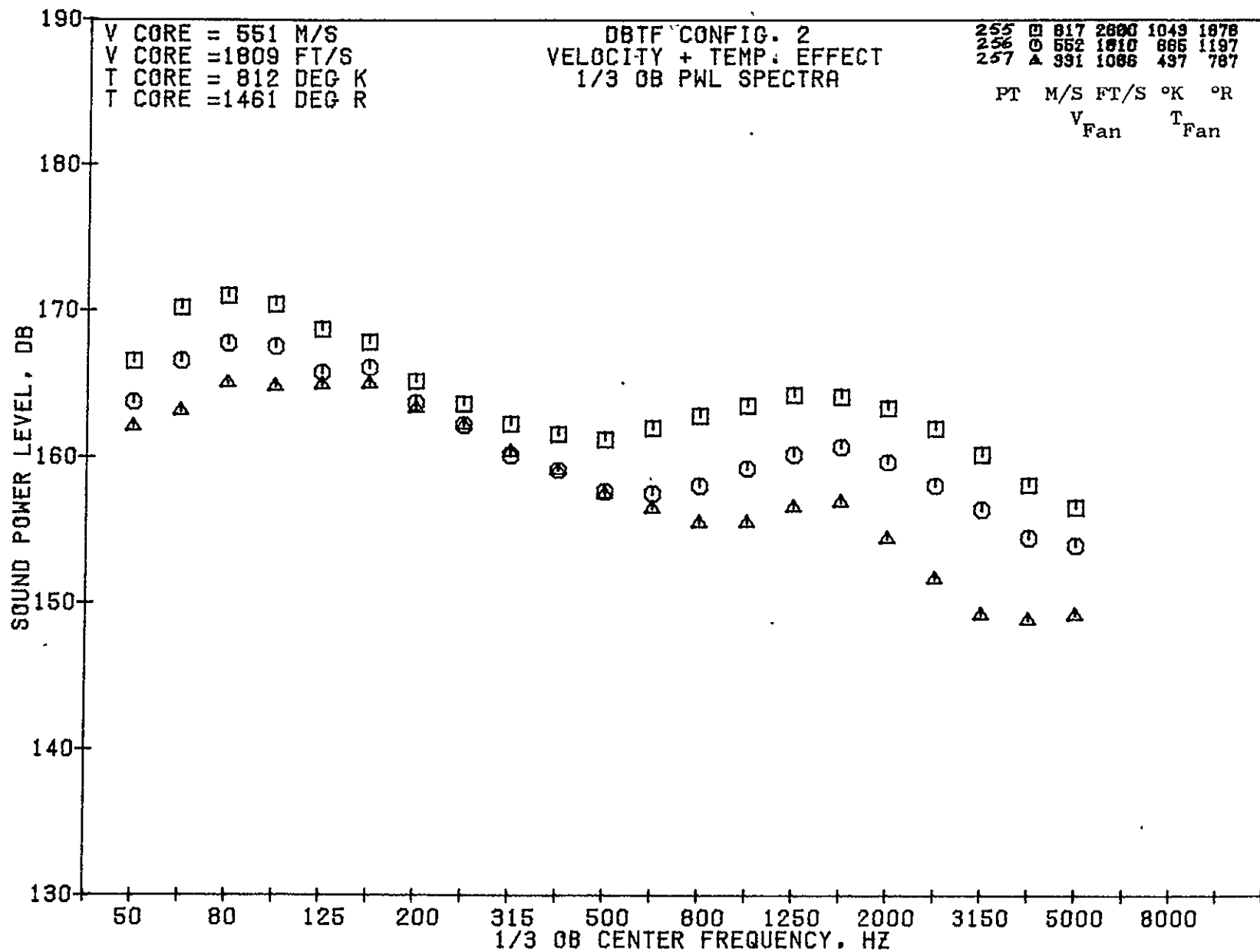
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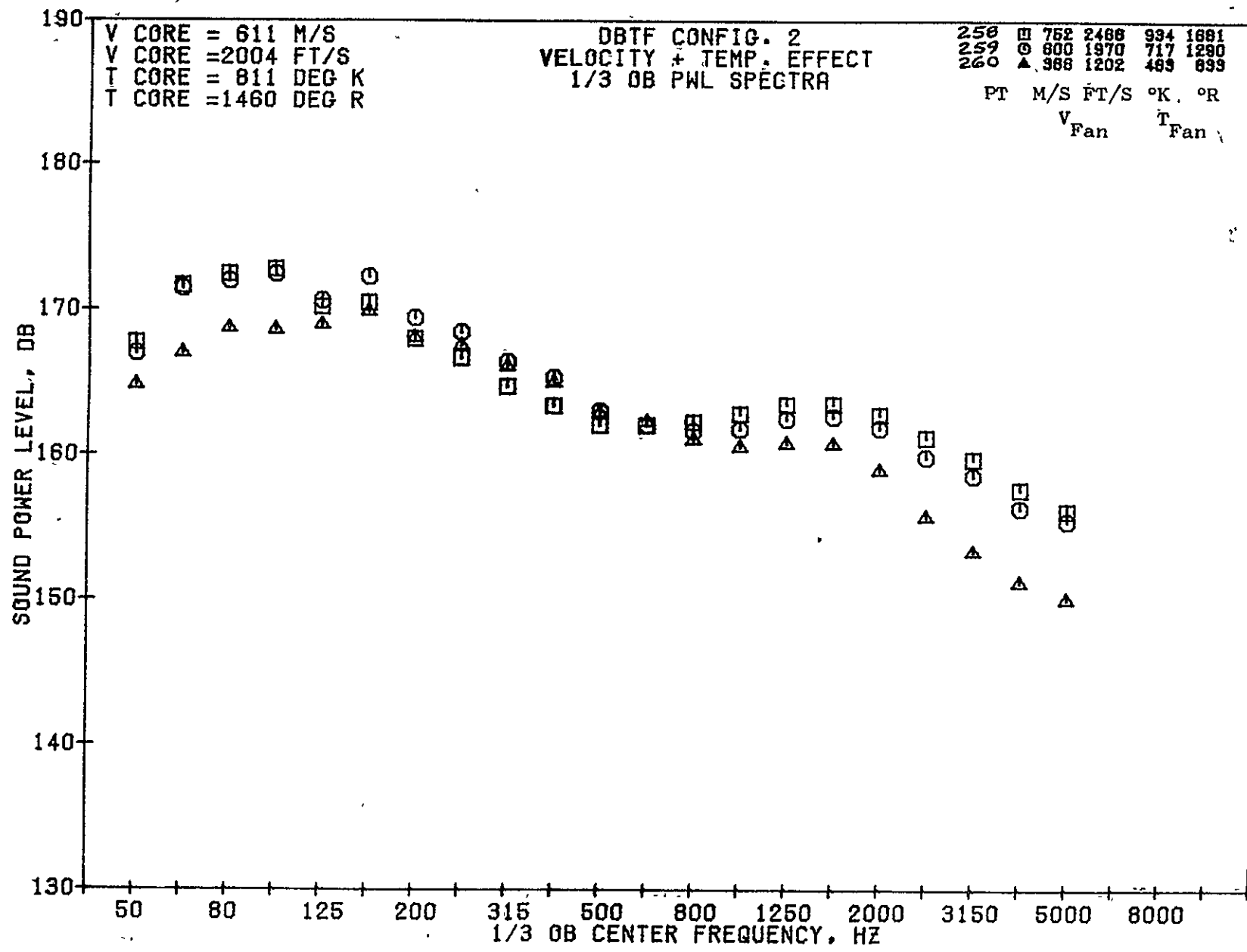
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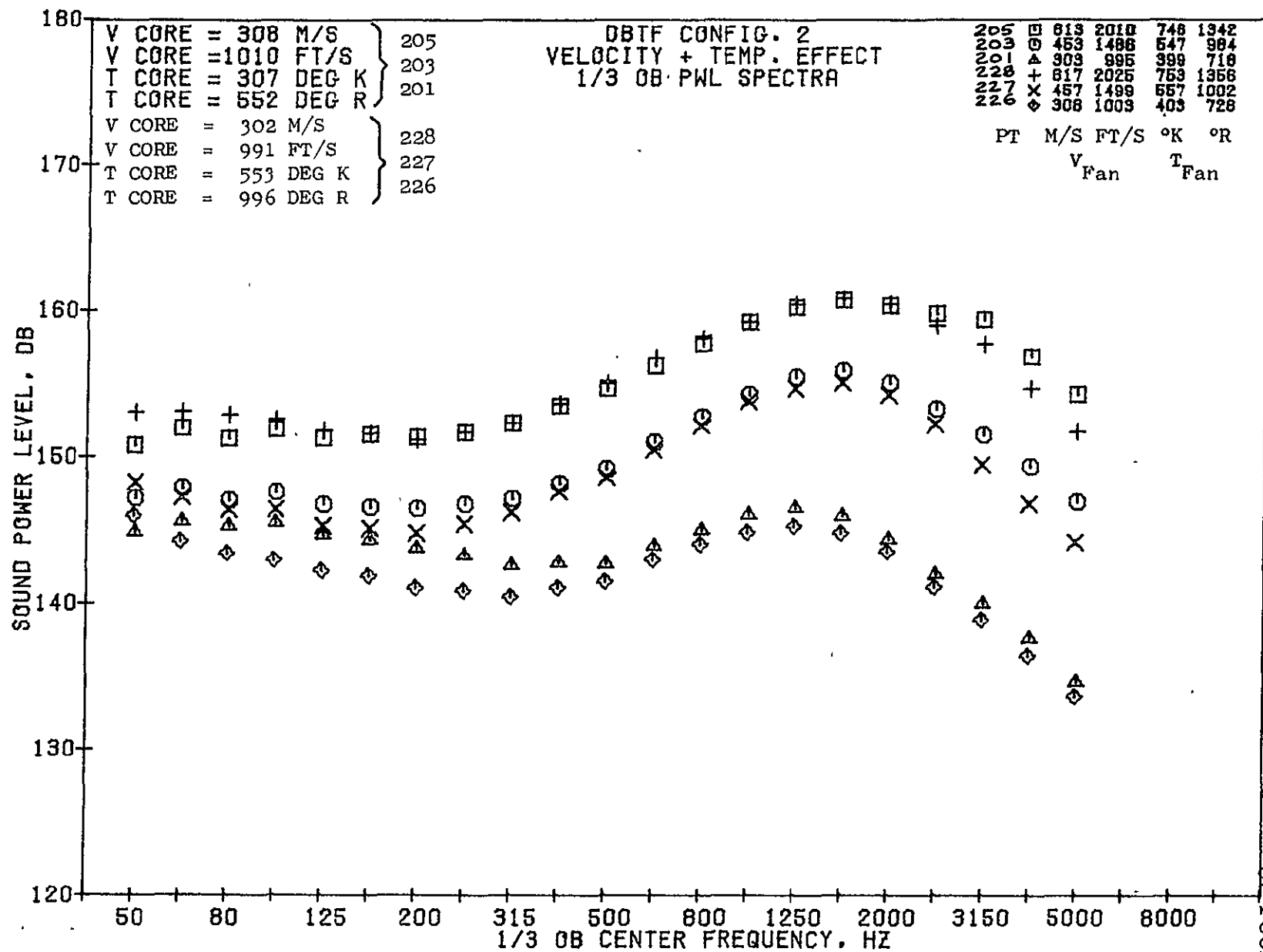
79 BURCH A.



4-133

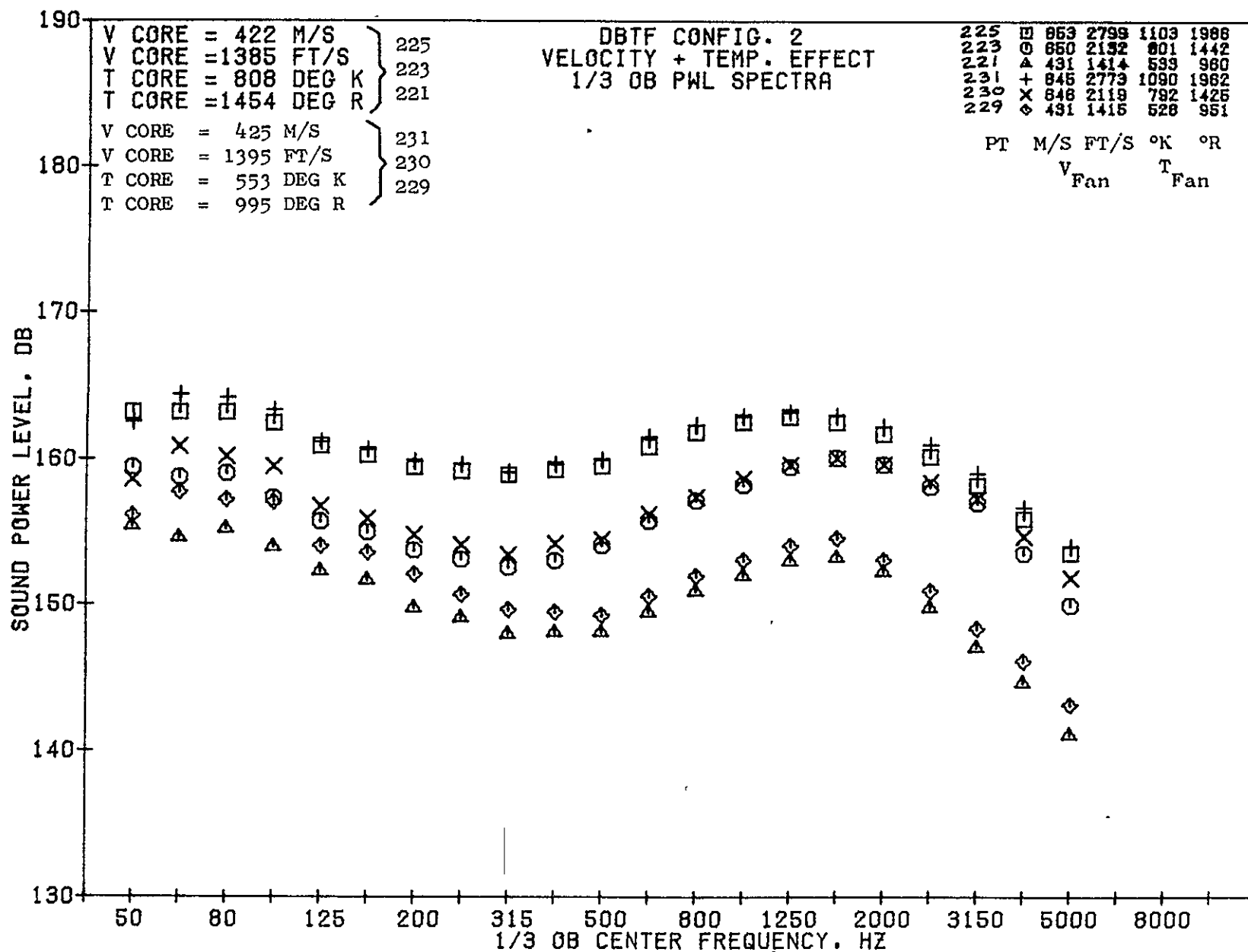
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1361

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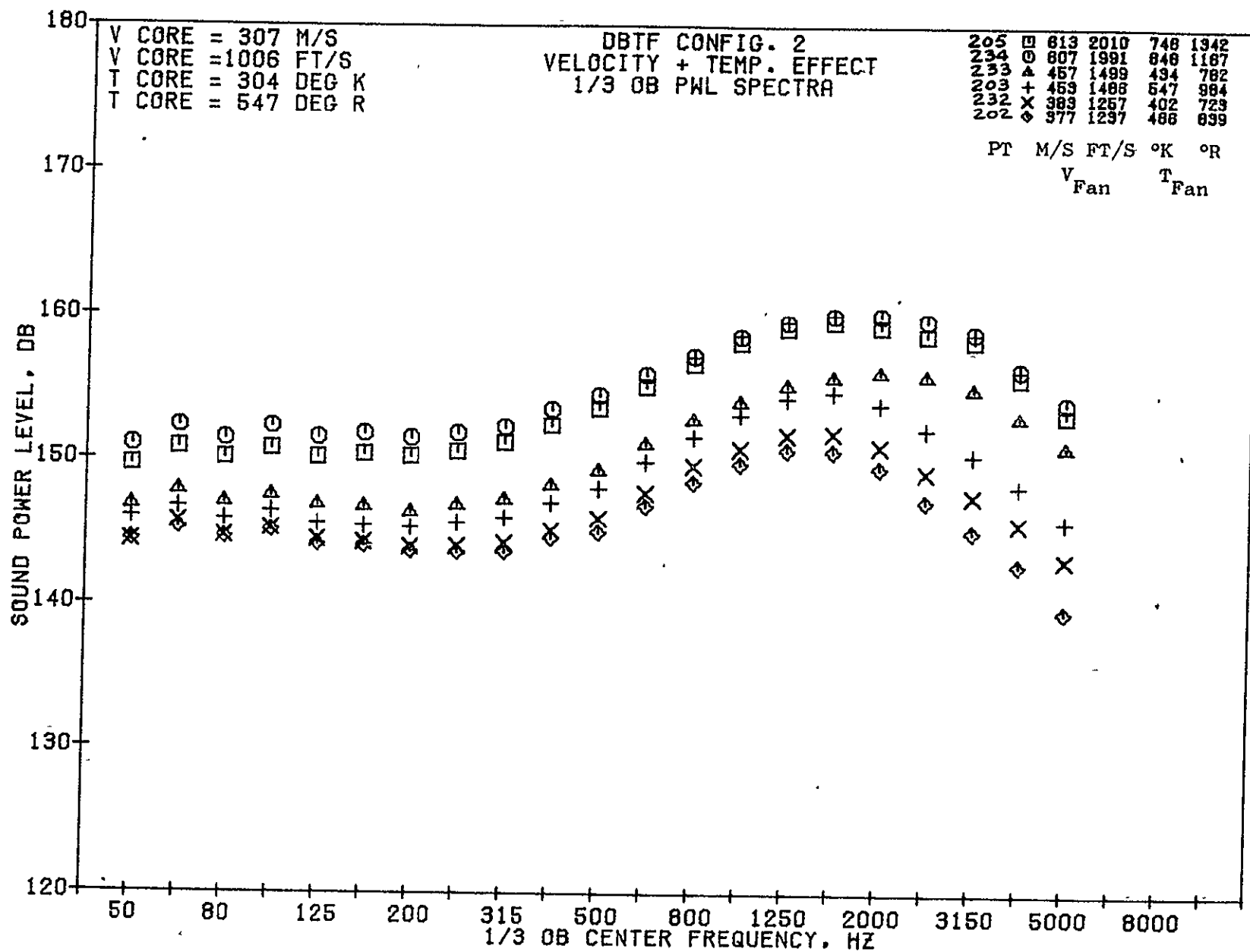
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1362



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5R032-001

79 BURC

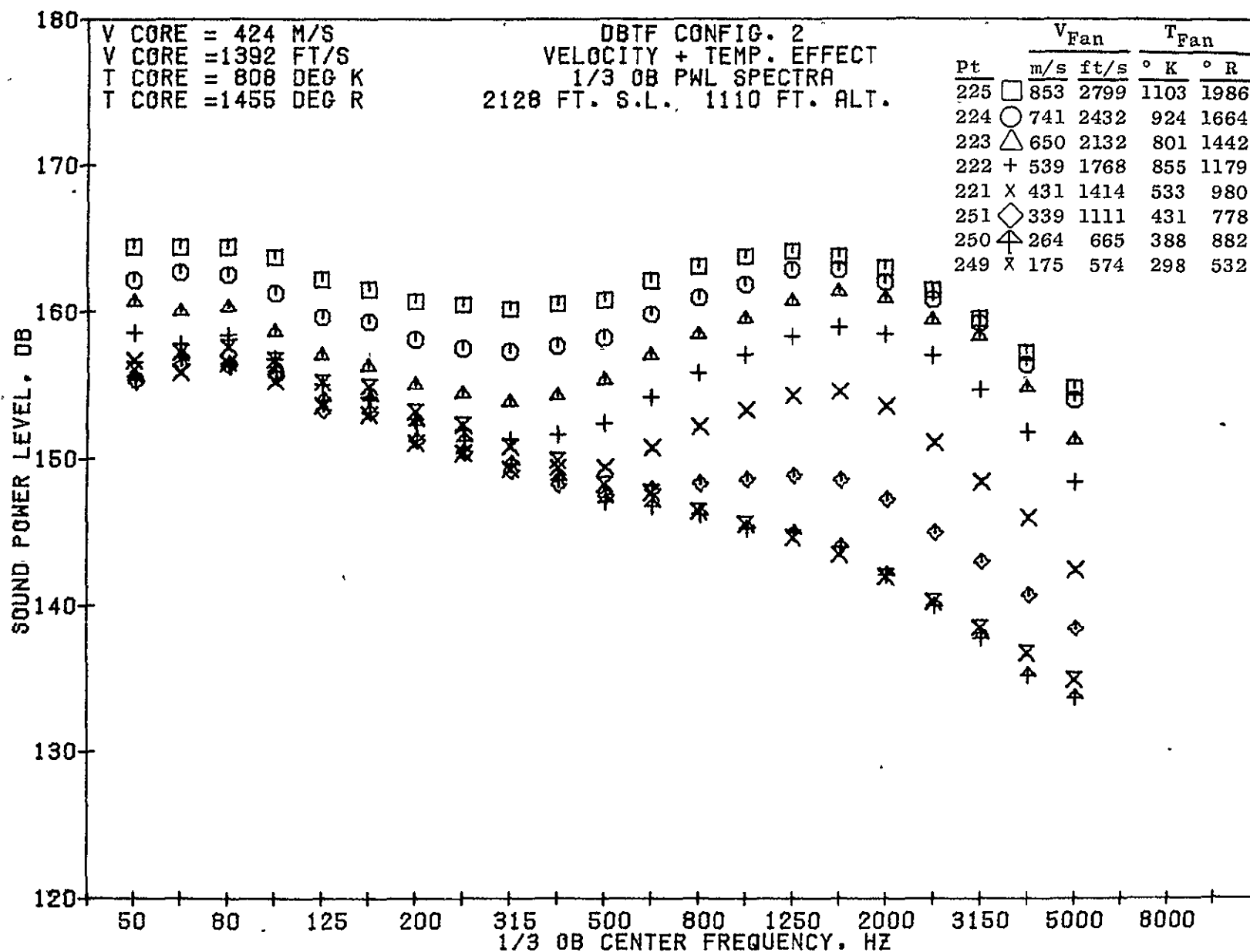


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79 BURCH A.

1364

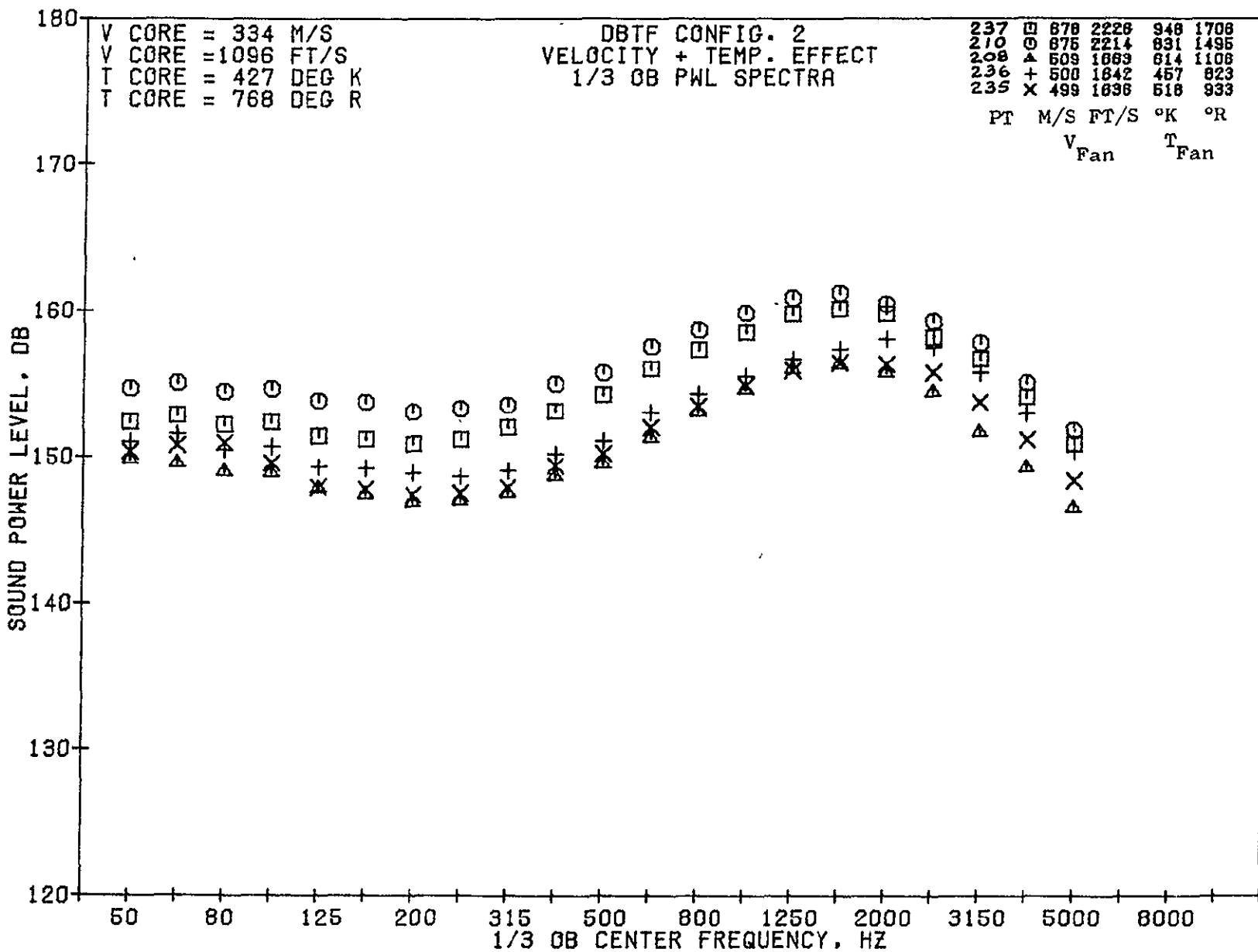


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8570

79 BURC

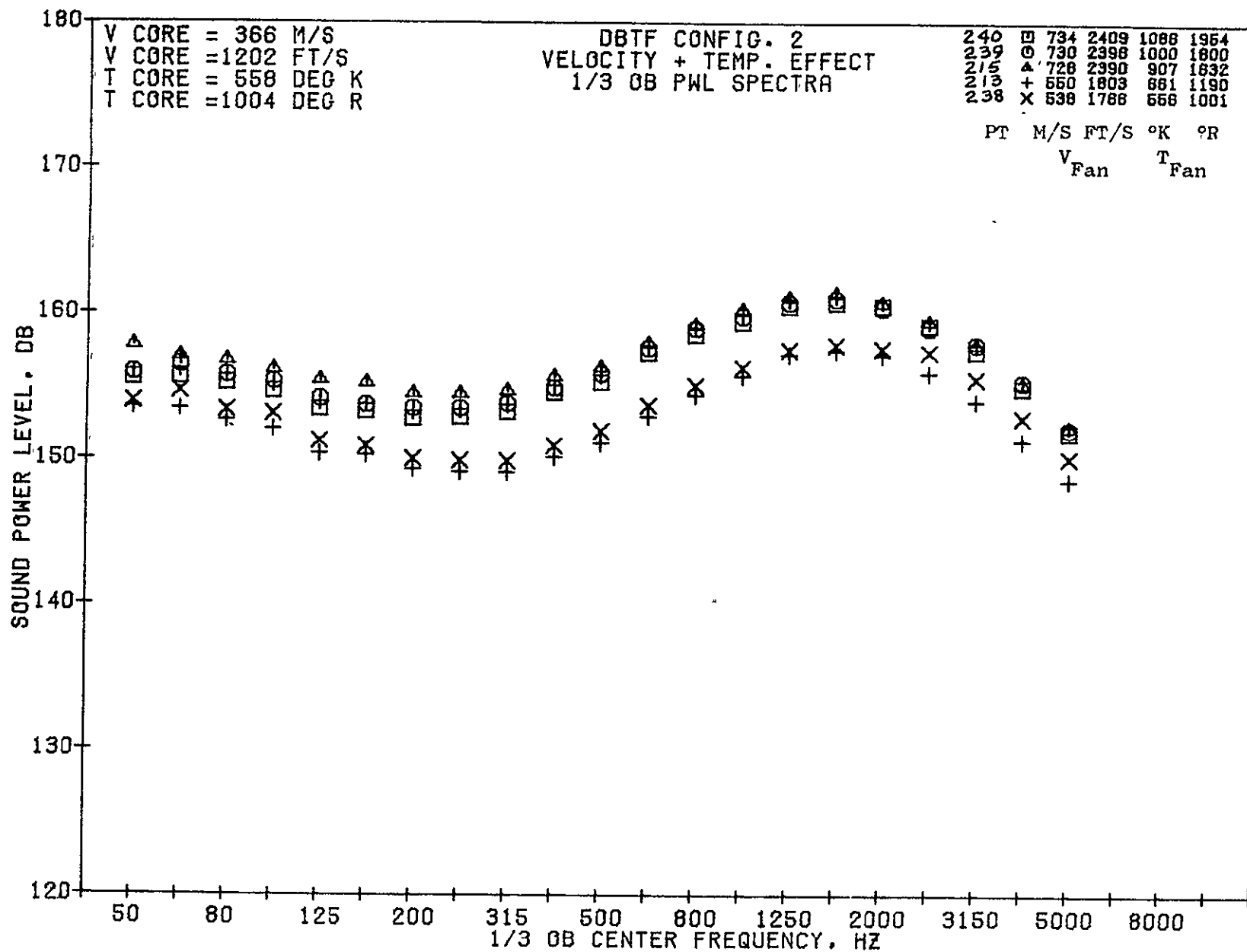


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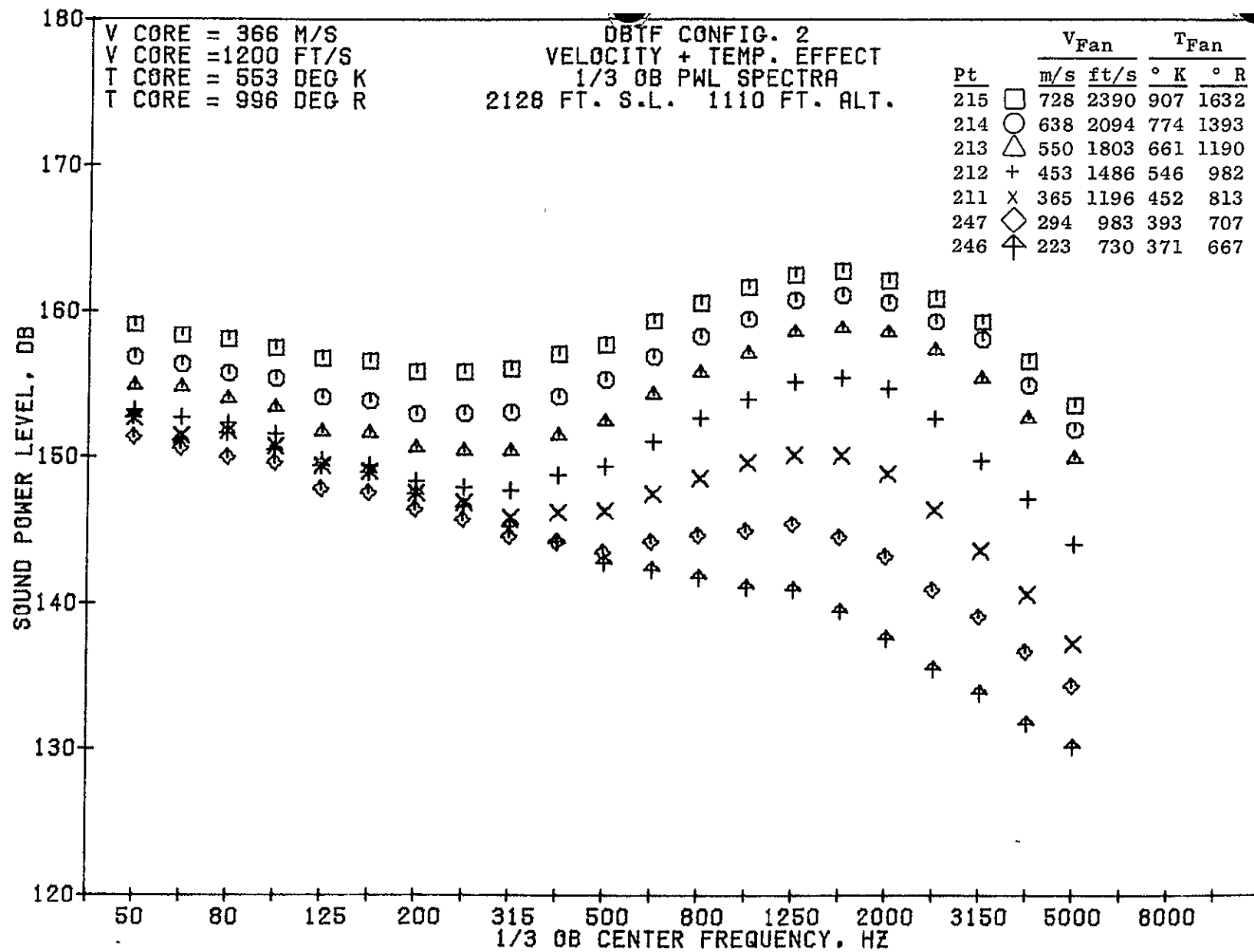
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1366



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79 BURCH.

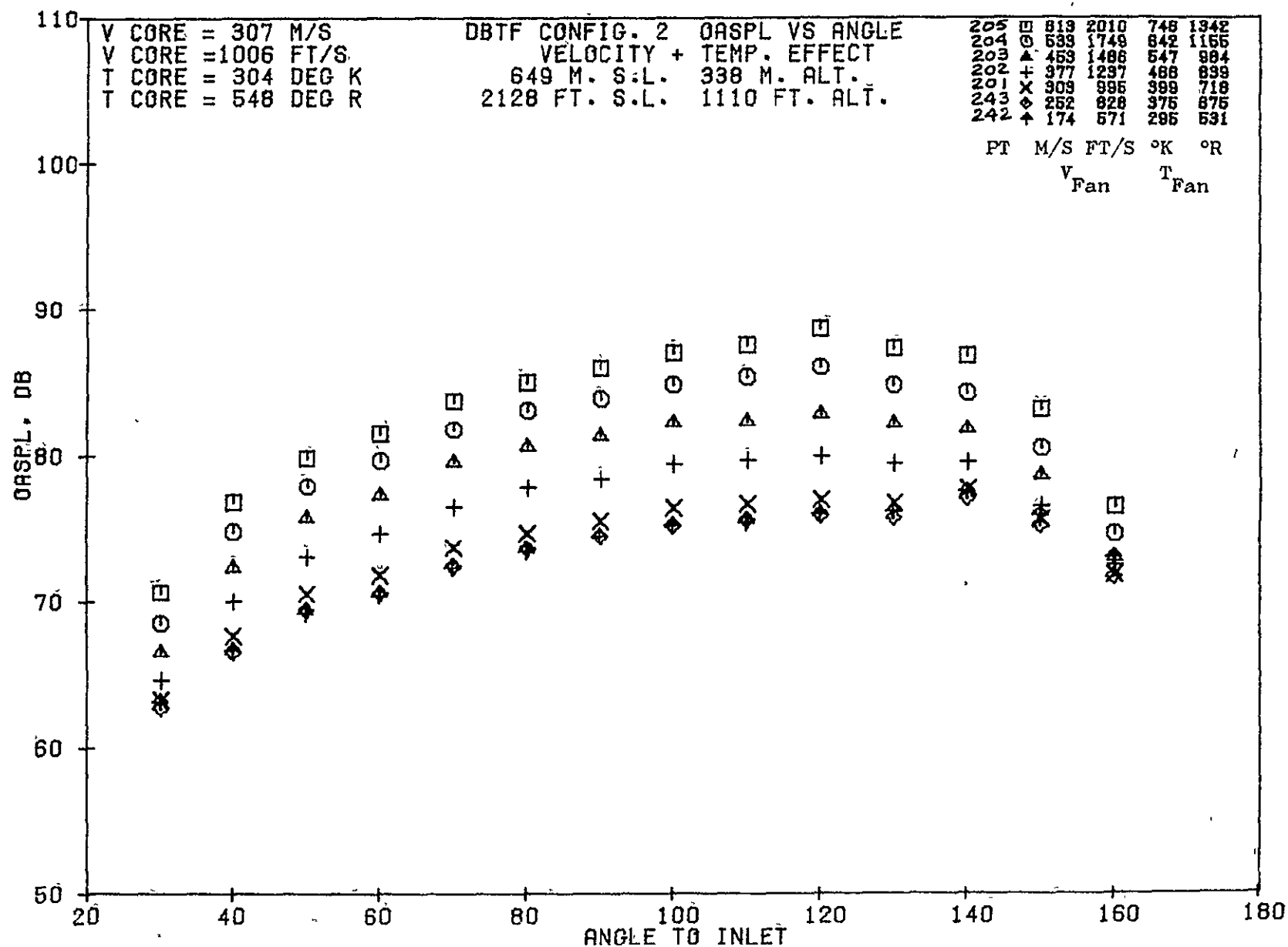


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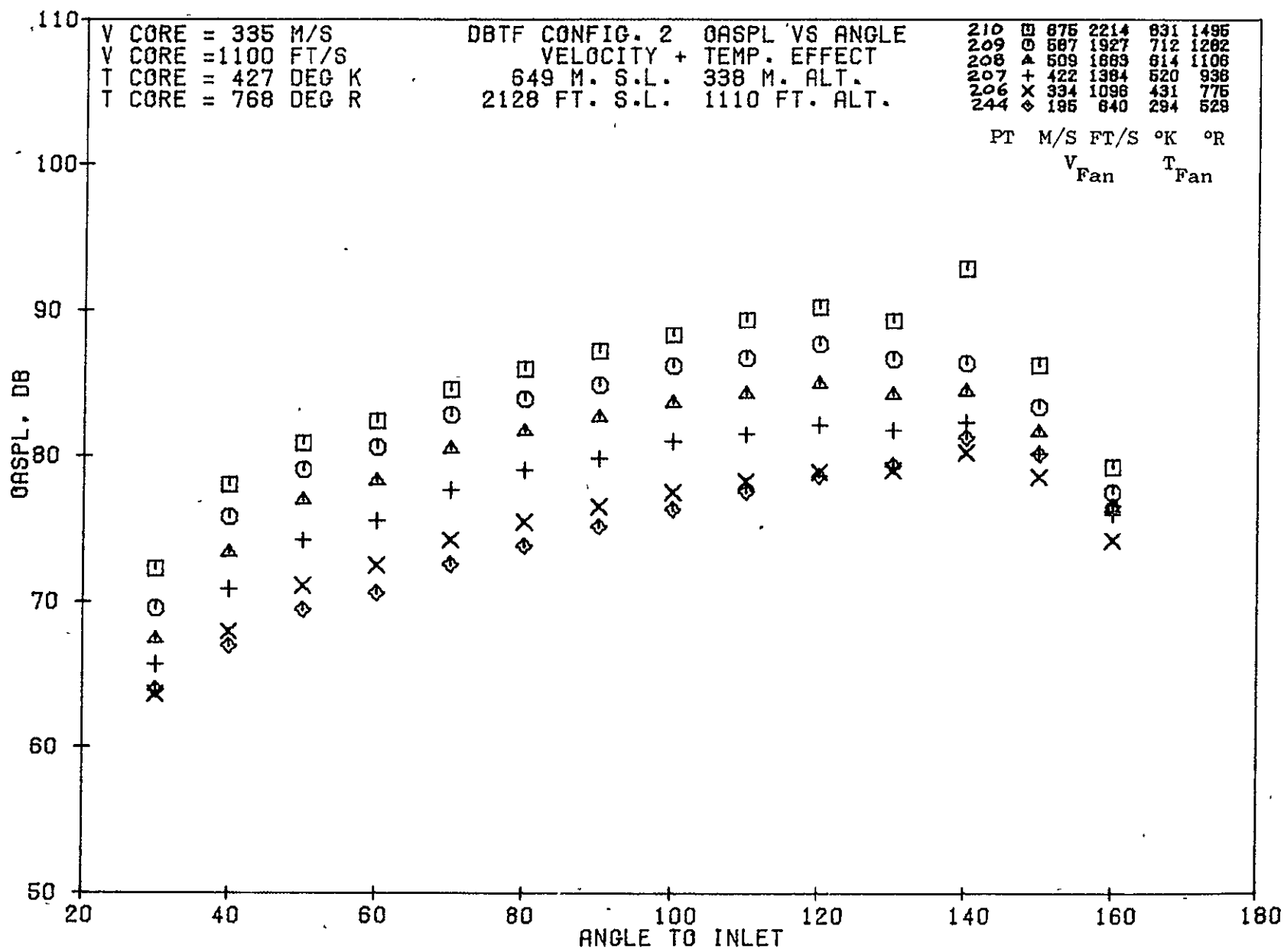
79 AIRCRAFT

1368



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79 BURCA



1369

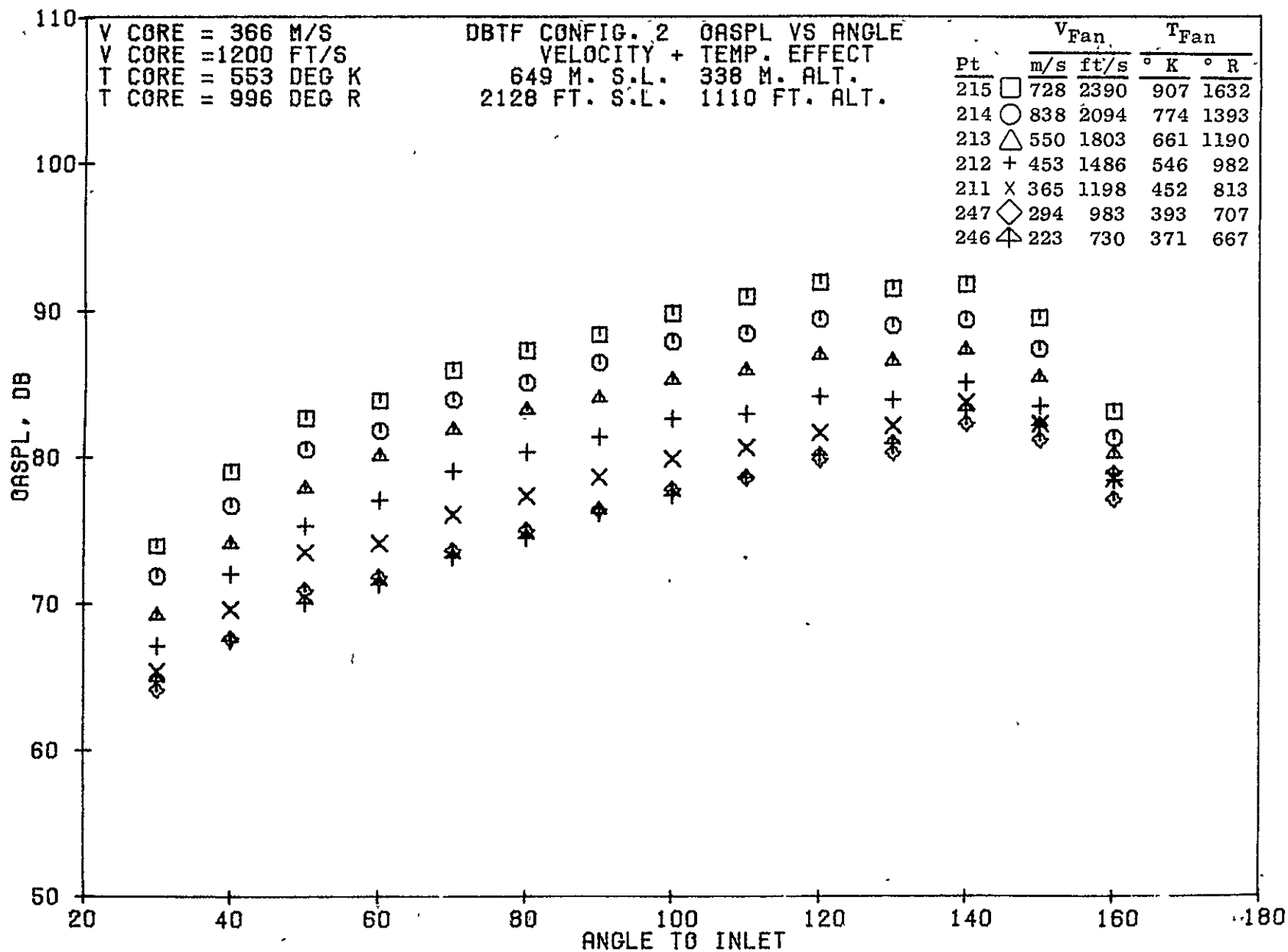
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5R032-001

79 BURCH A.

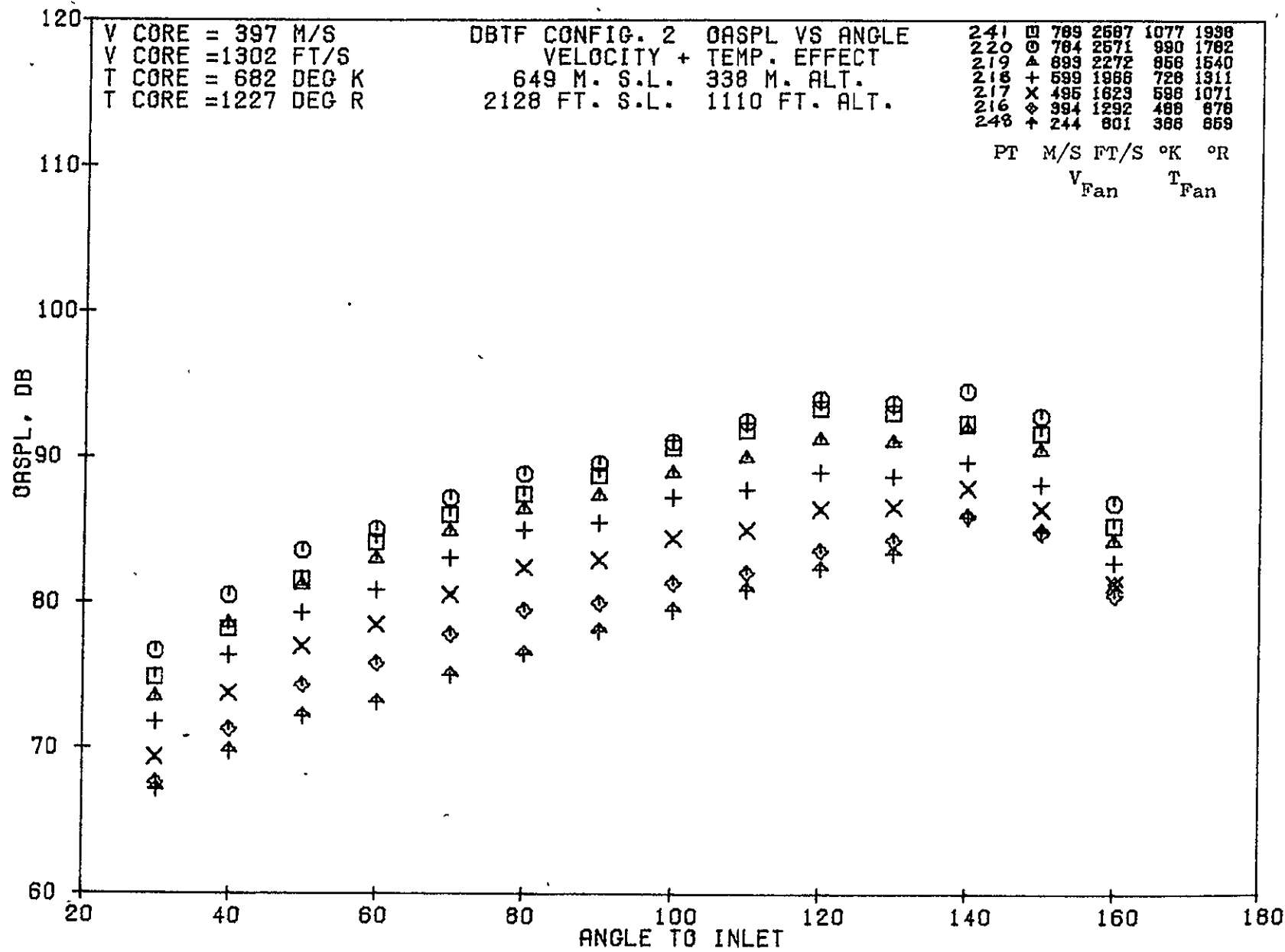
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1370

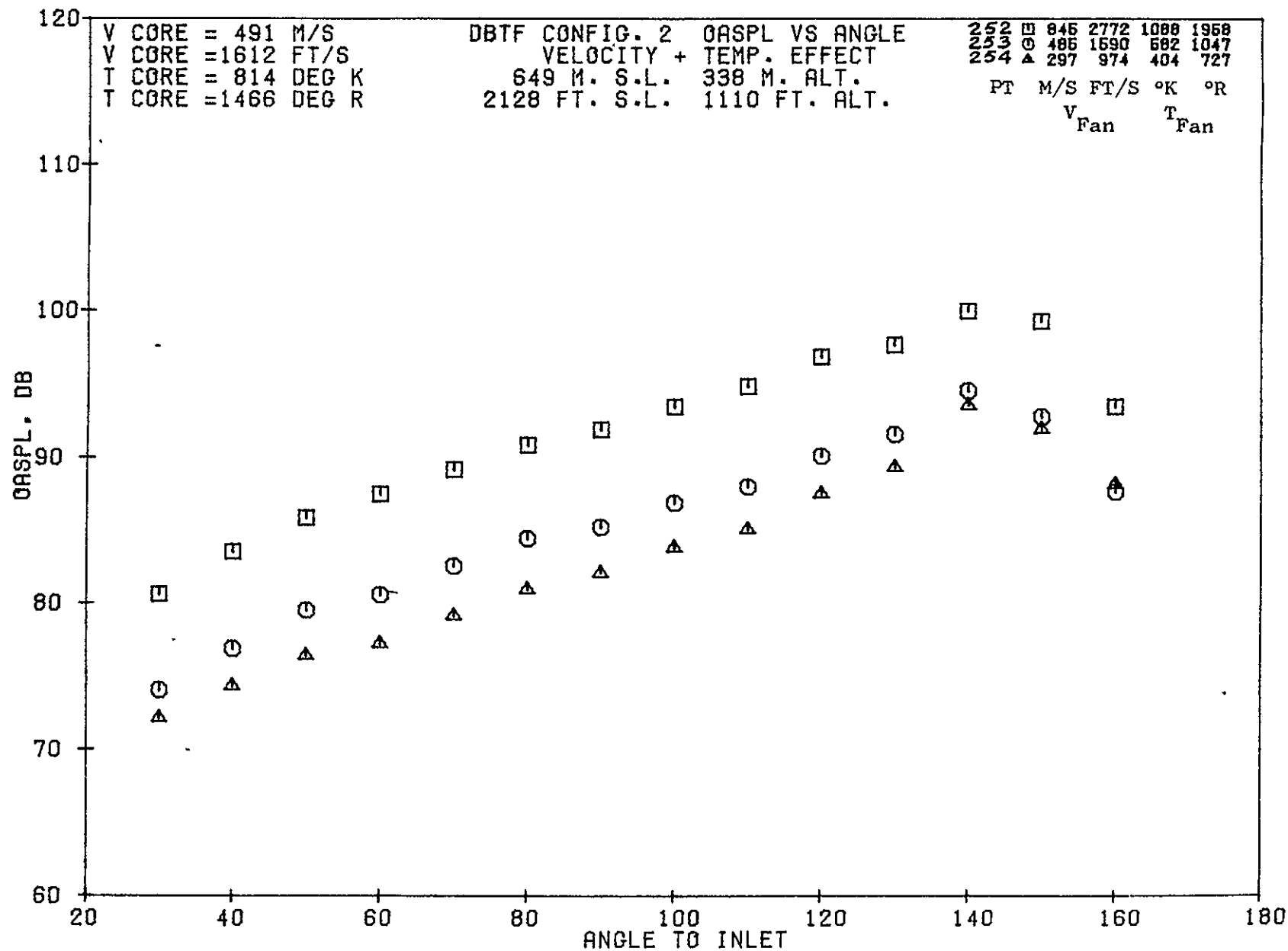


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79 BURC



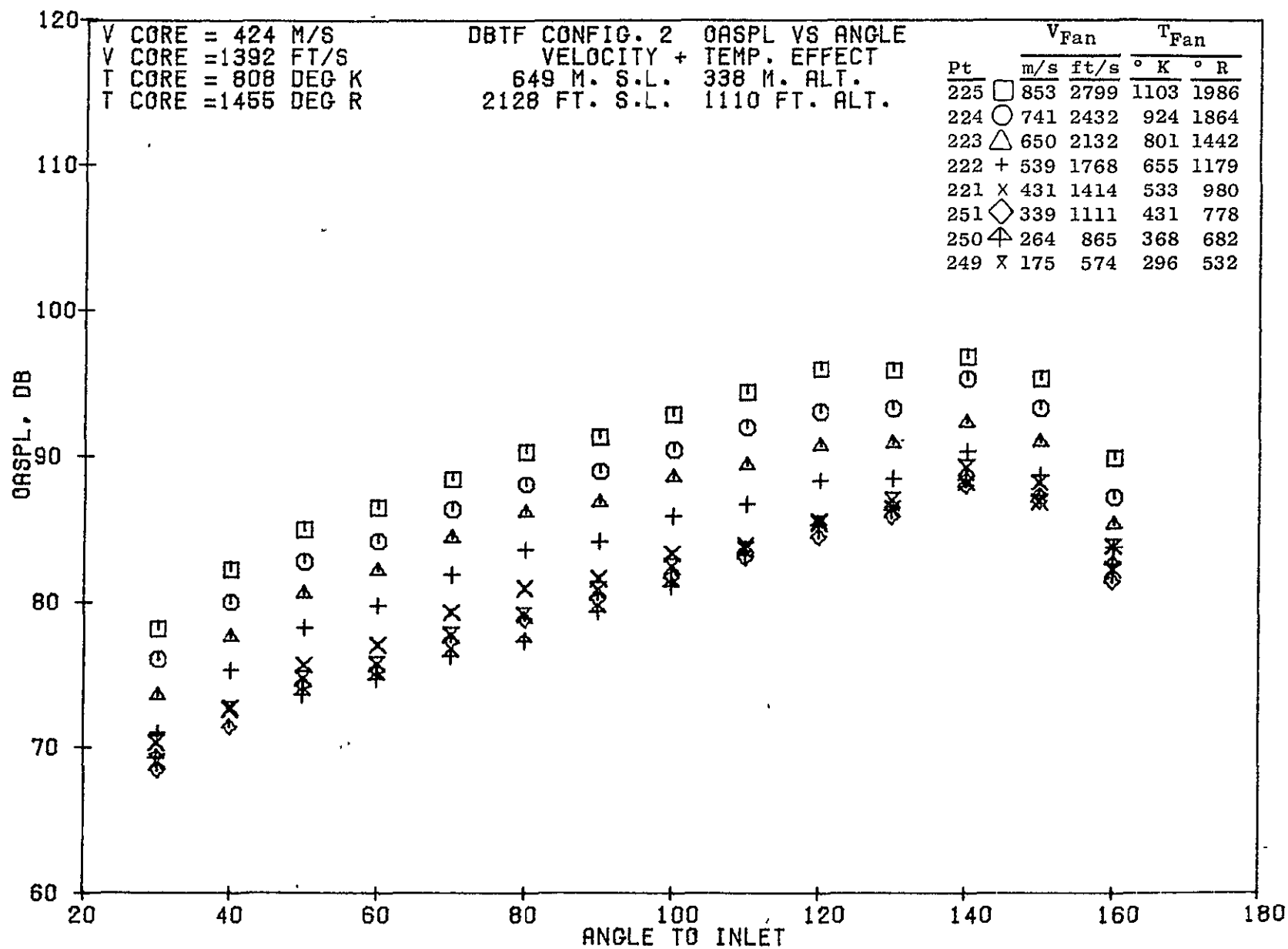
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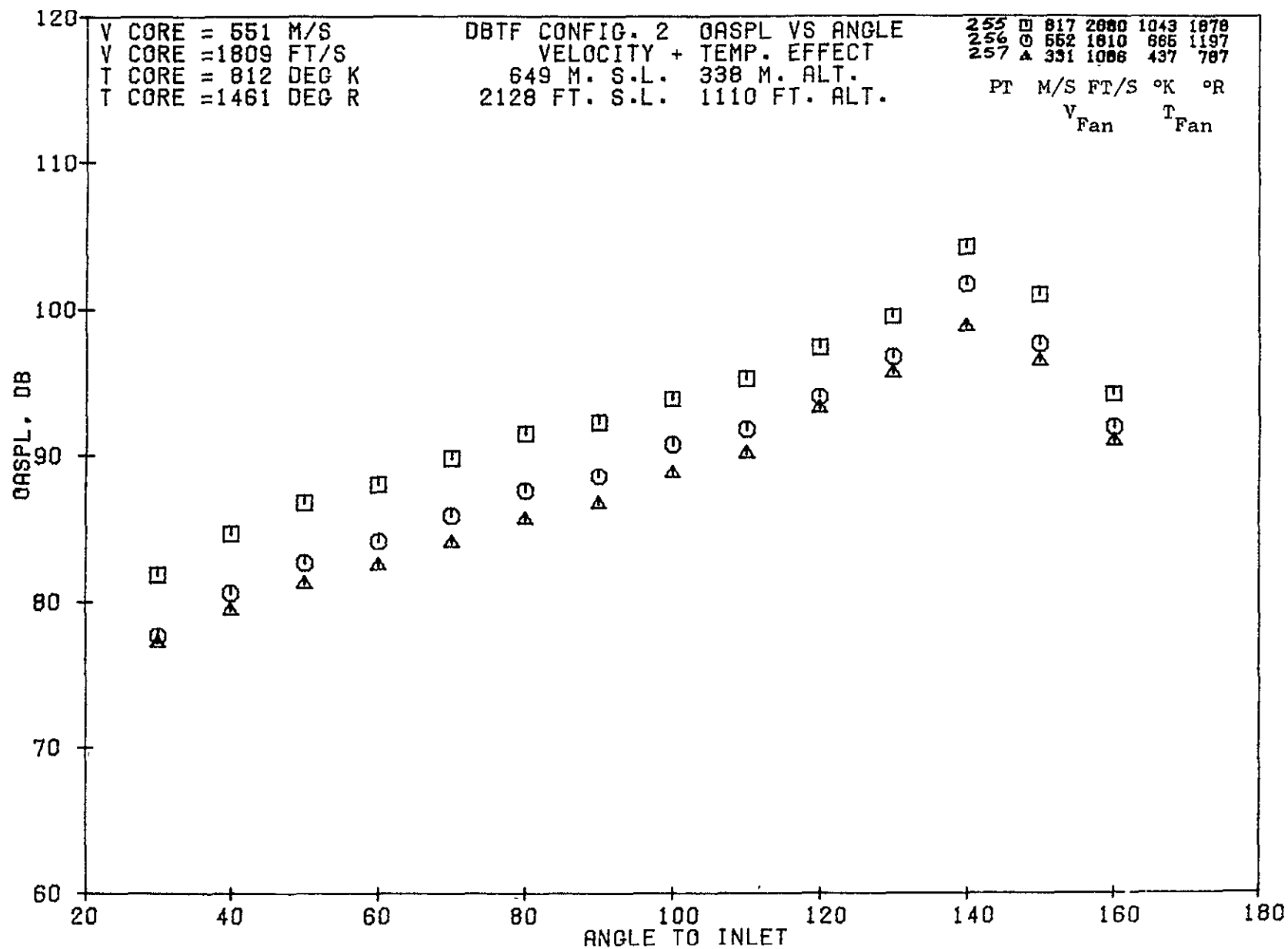
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79 BURCH A.

1373

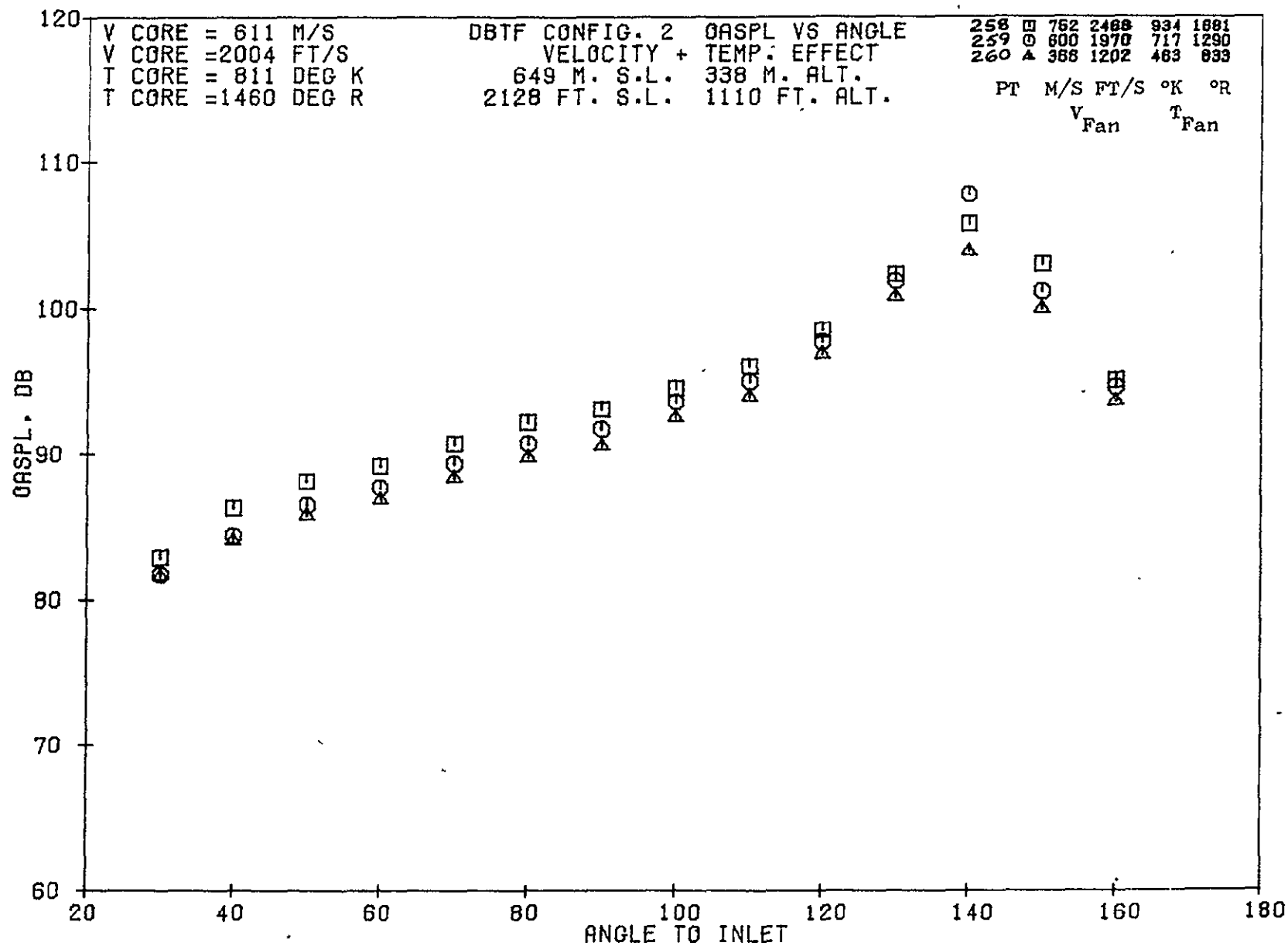
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5R266-001

79 AIRCH A.



08/13/75
5R032-001

79 BURC

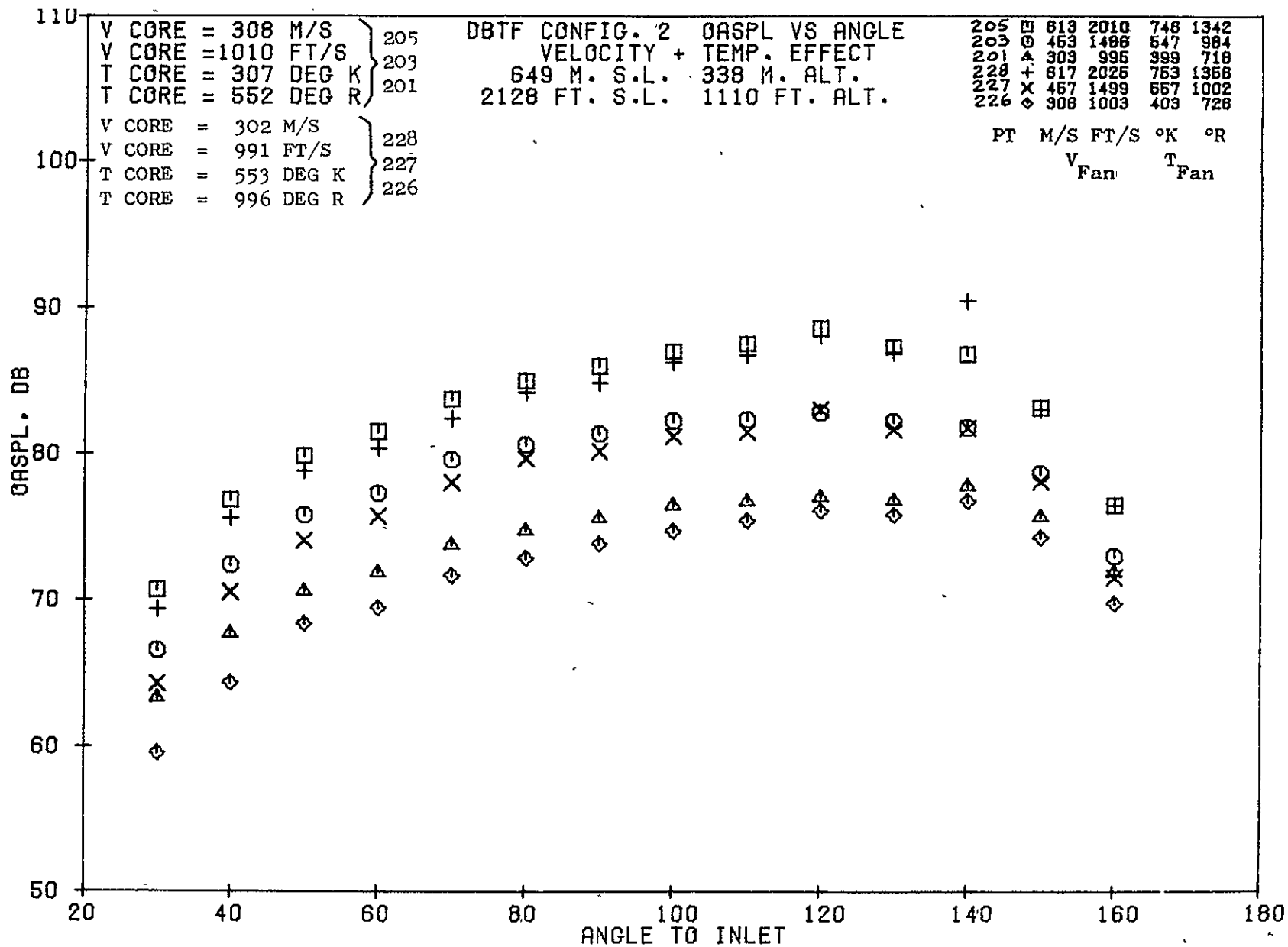


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5R032-001

79 BURCH A.

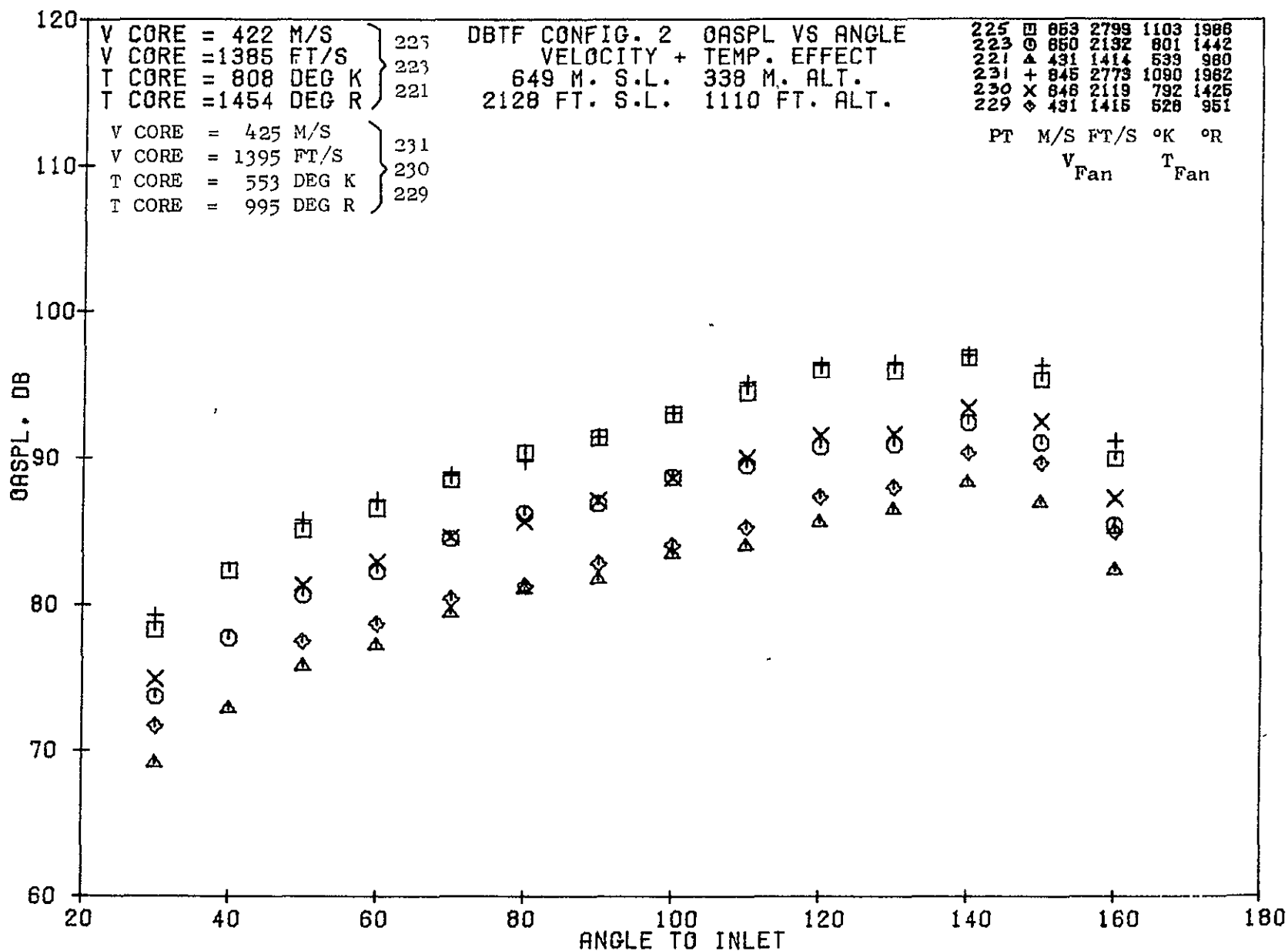
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08/13/75
5R032-001-

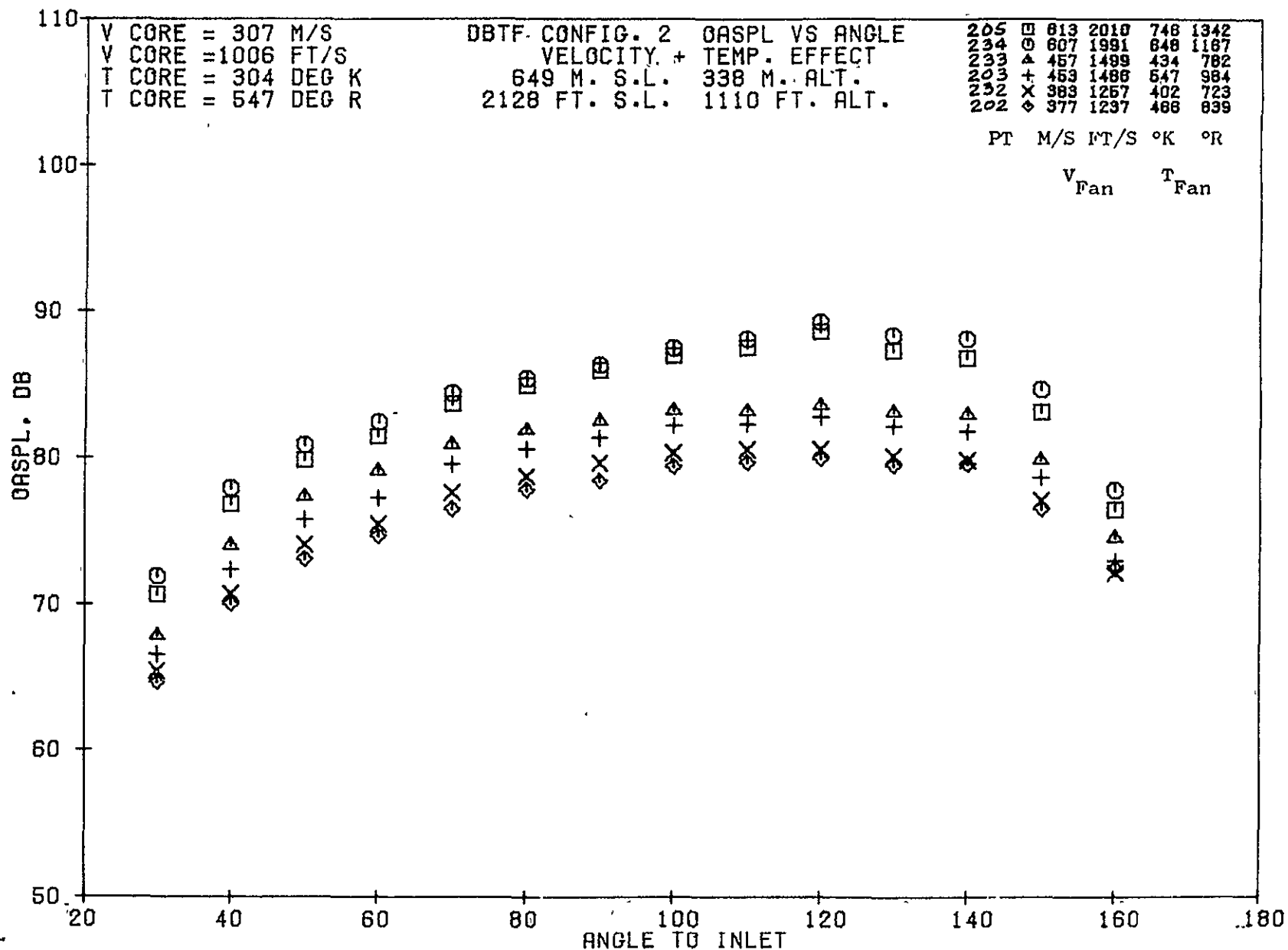
79 BURC

1377

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5R032-001

79 BURCH-A.

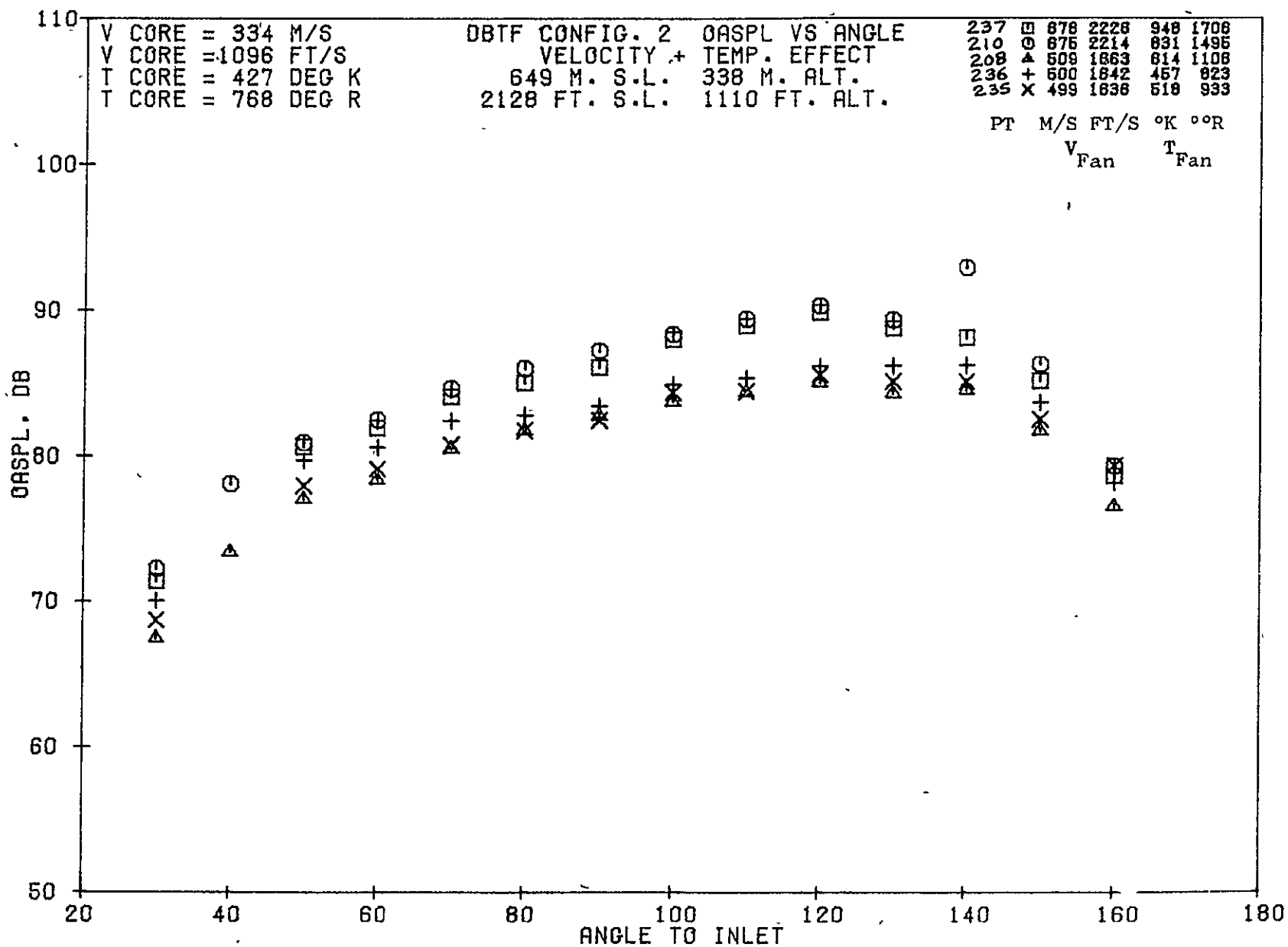
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08/13/75
5R032-001

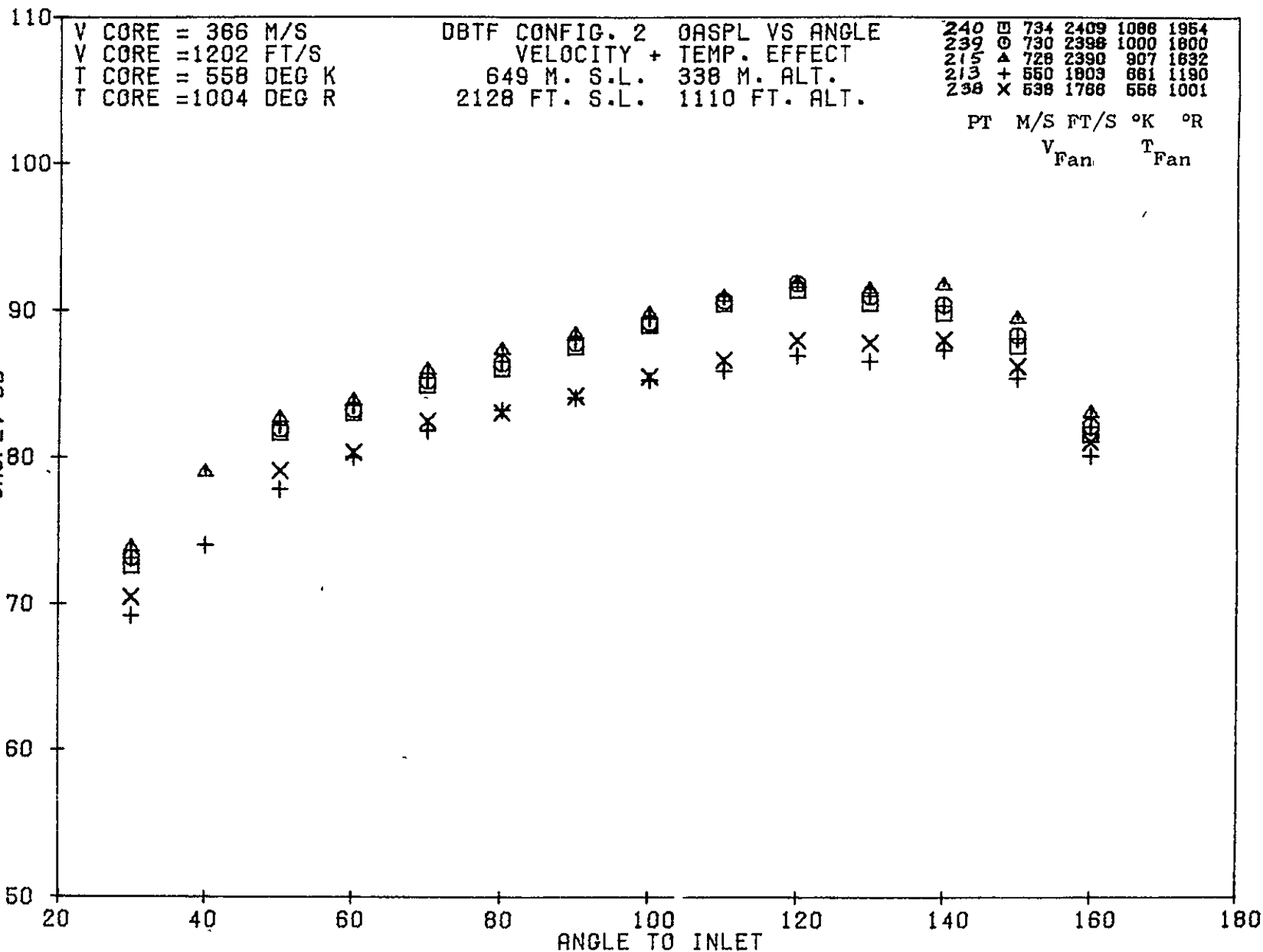
79 BURCH A.

1379


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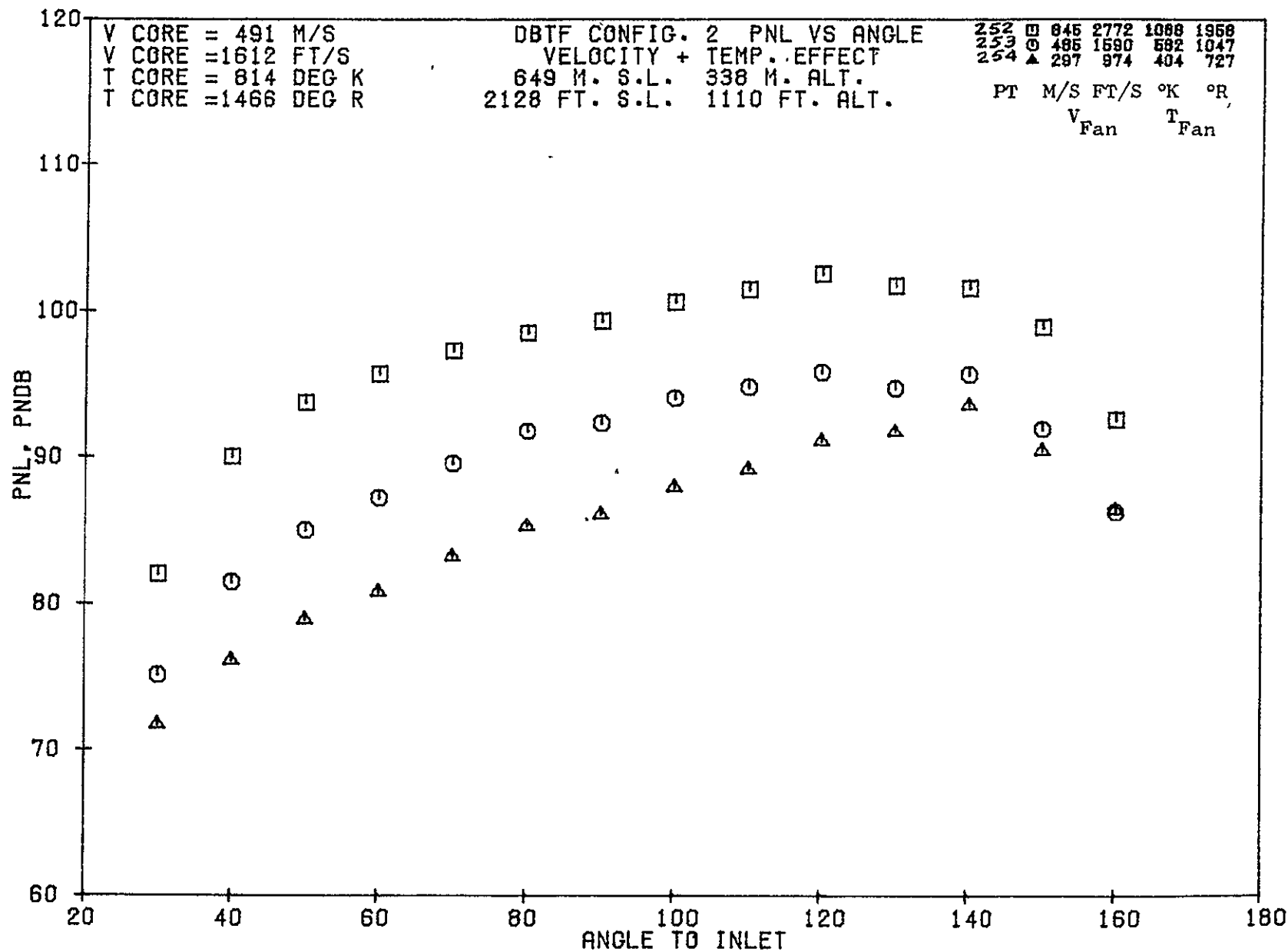
 08/13/75
 5R032-001

79 BURCH A.



08/13/75
 5R032-001

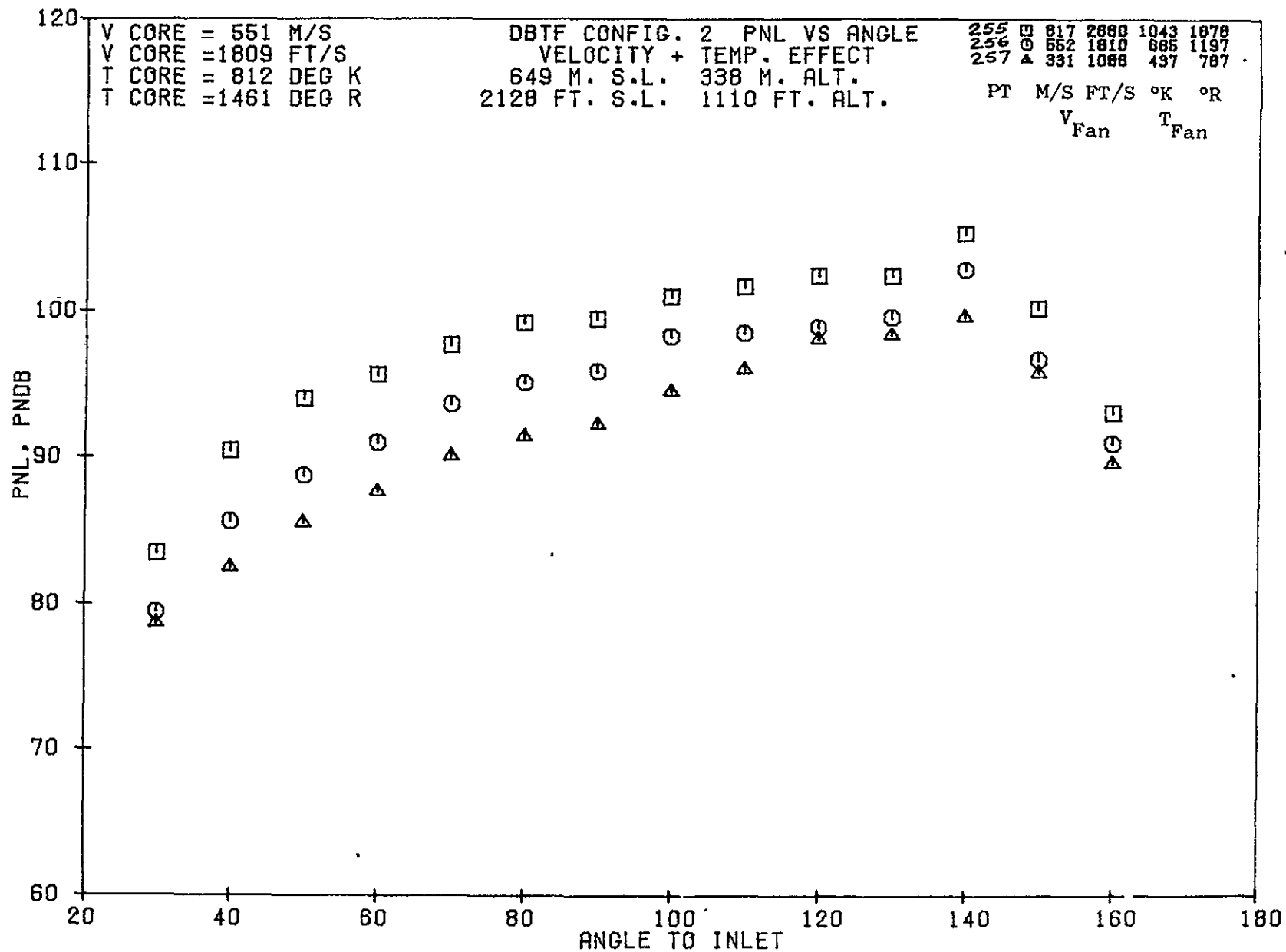
79 BURCH



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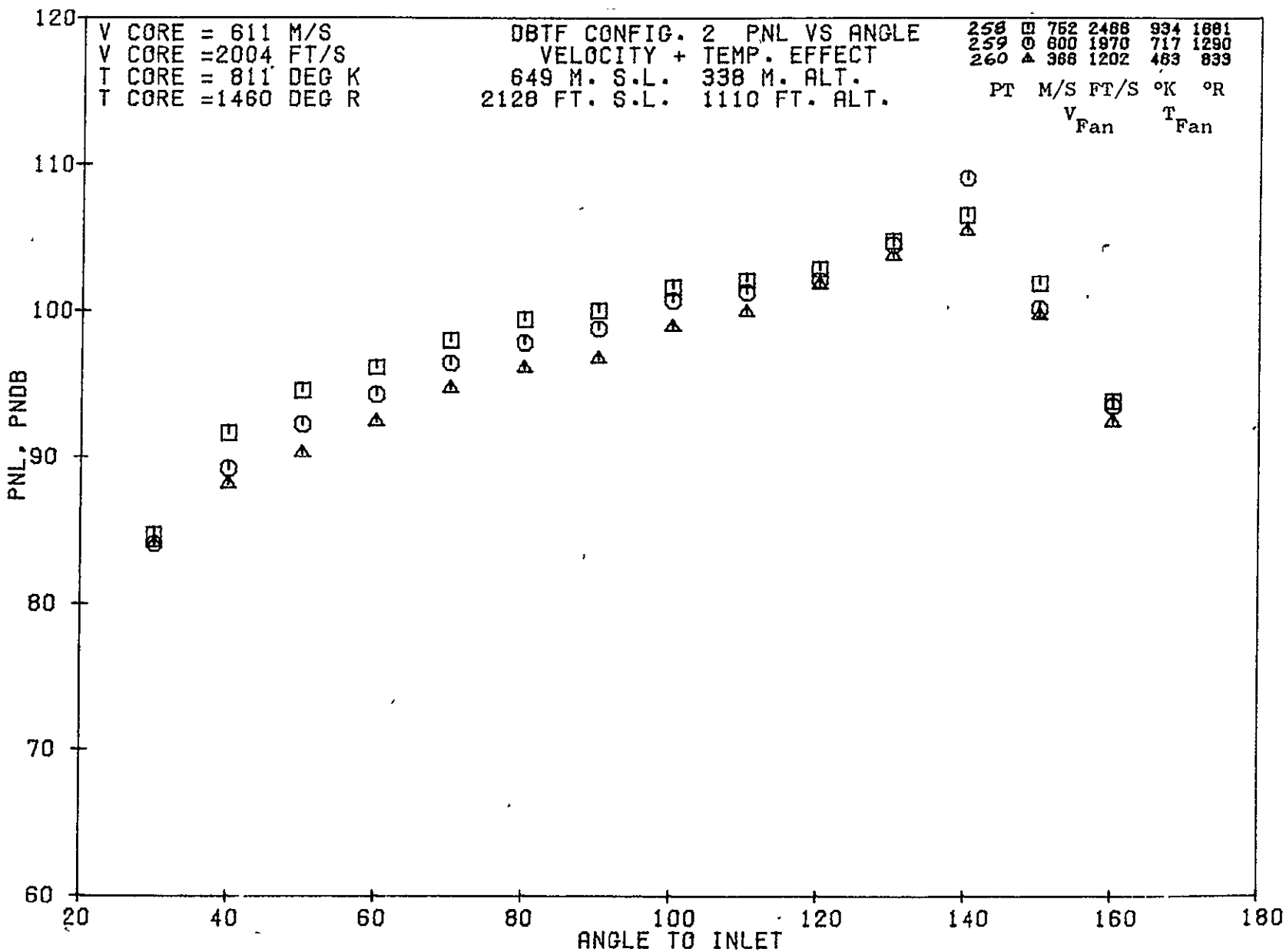
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5R266-001

79 BURCH A.



08/13/75
5R032-001

79 BURCH A.

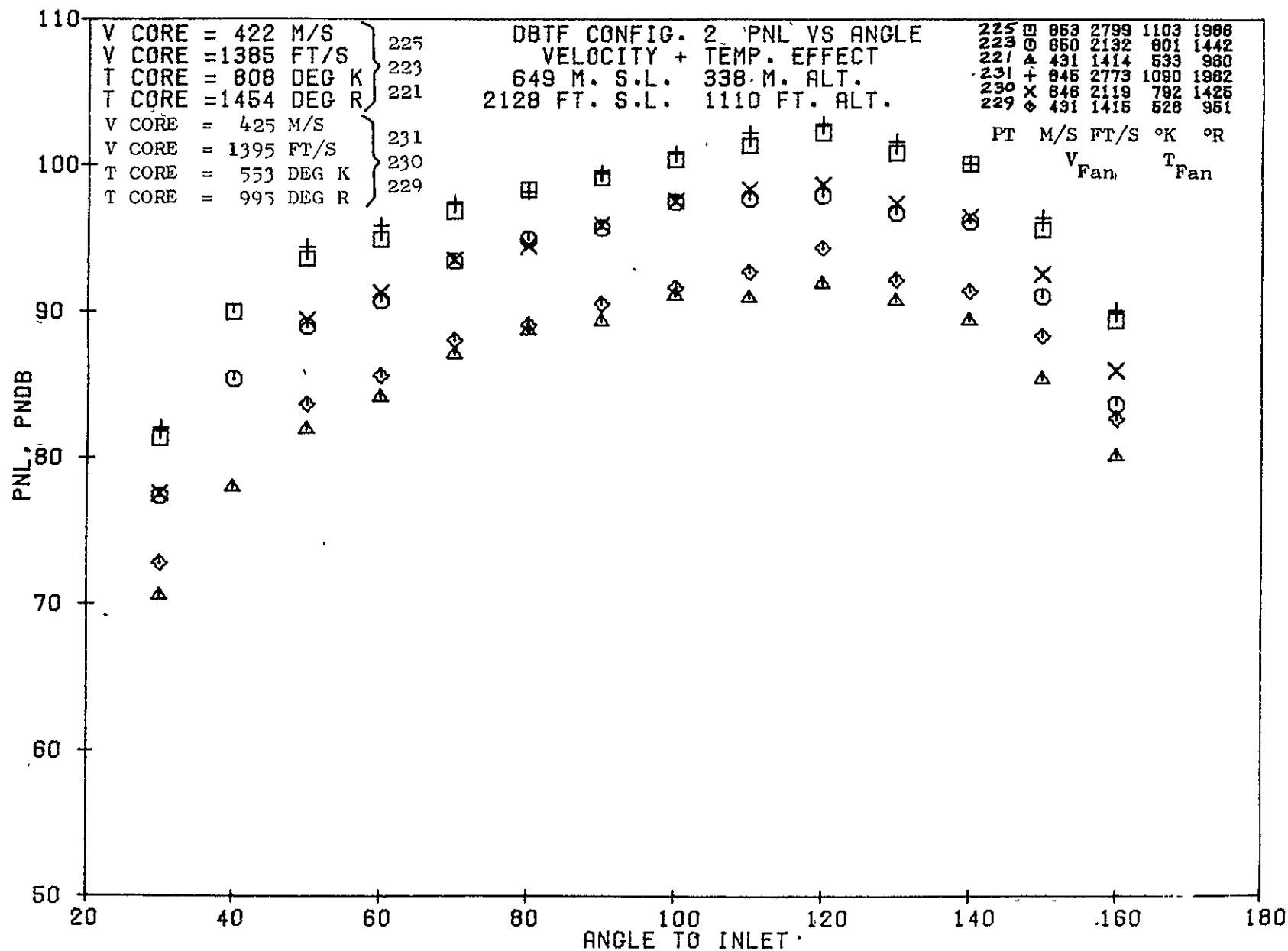


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5R032-001

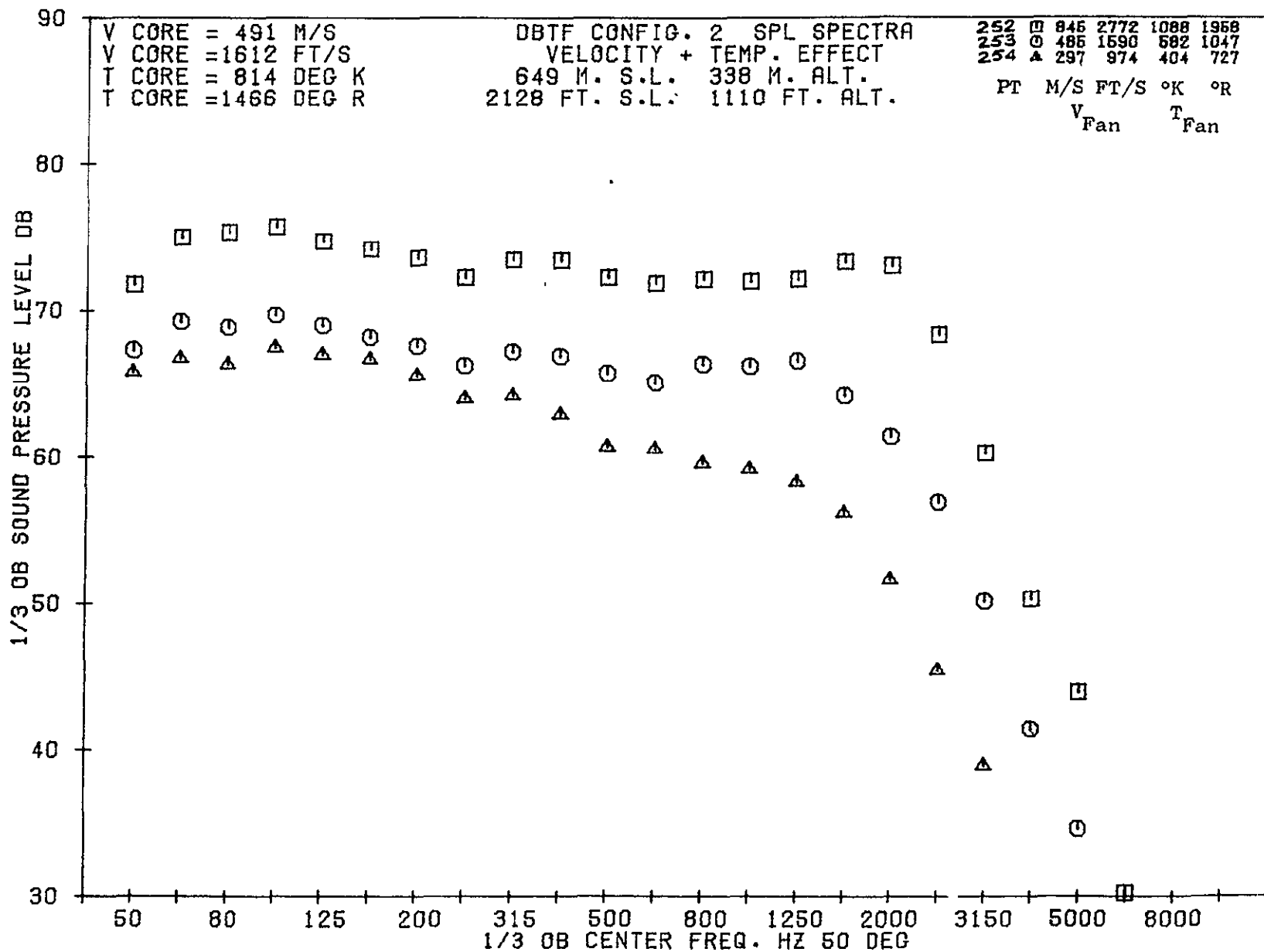
79 BURCH A.

1384

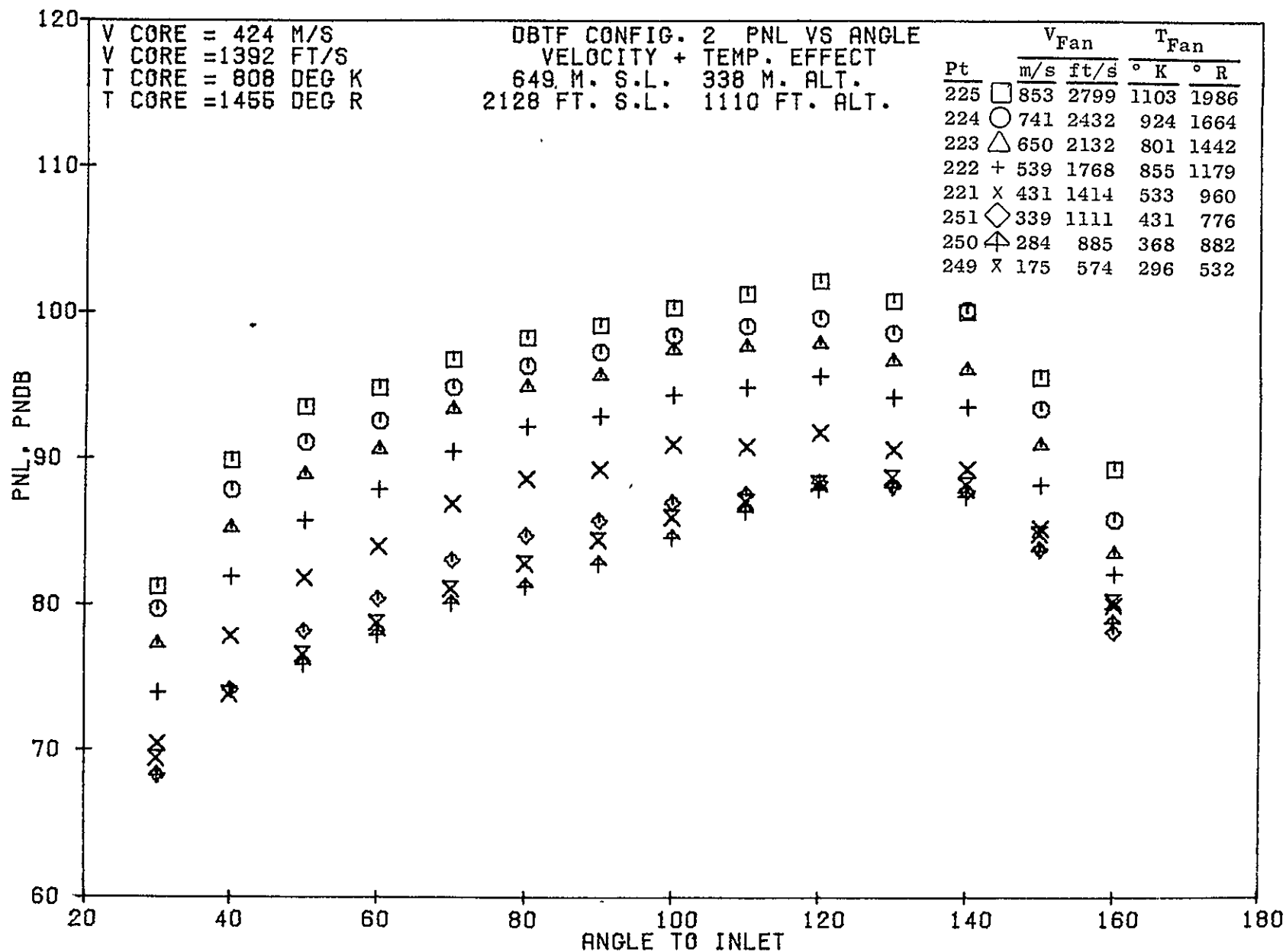


08/13/75
5R032-001

79 BURC

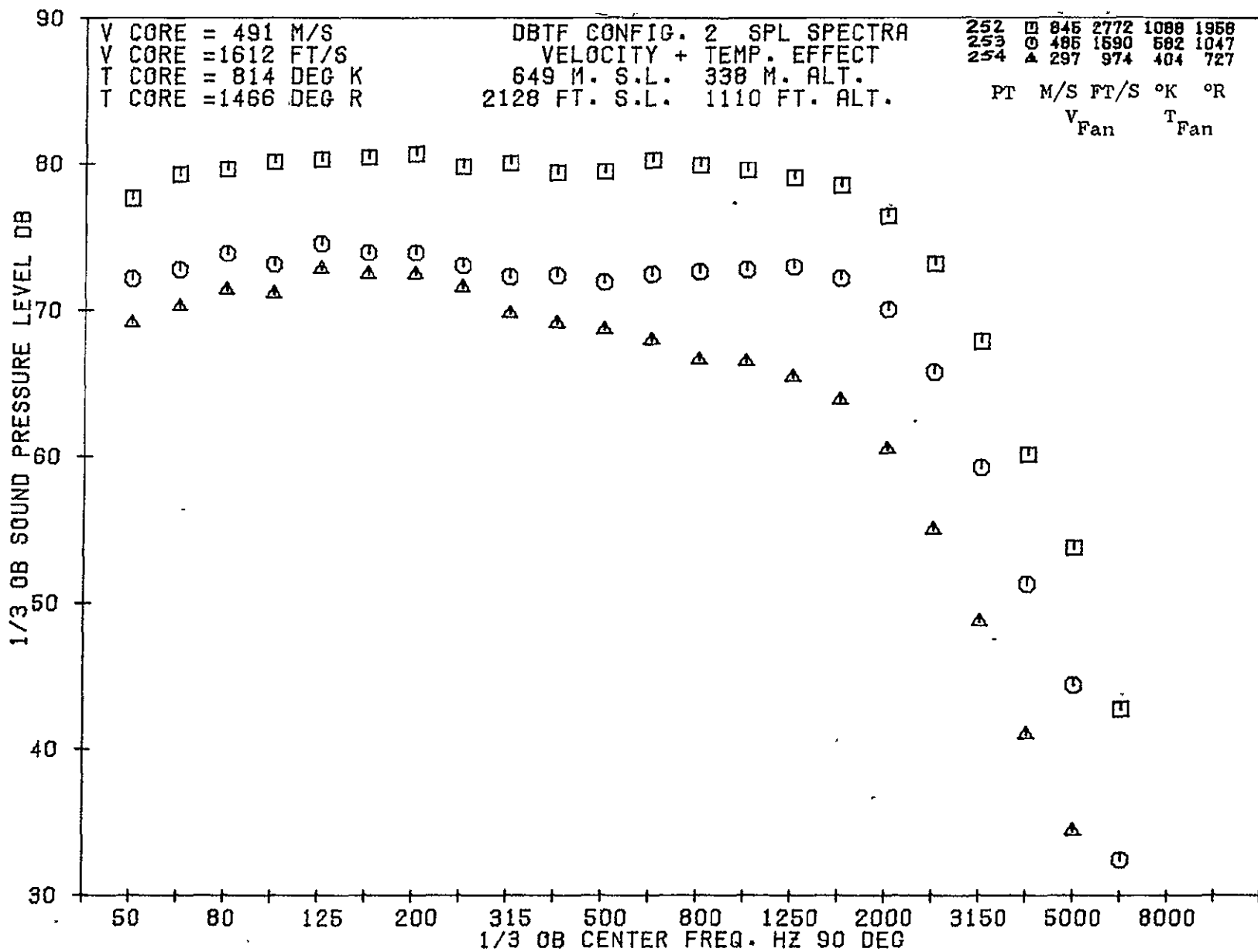


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5R266-001

79 AIRC

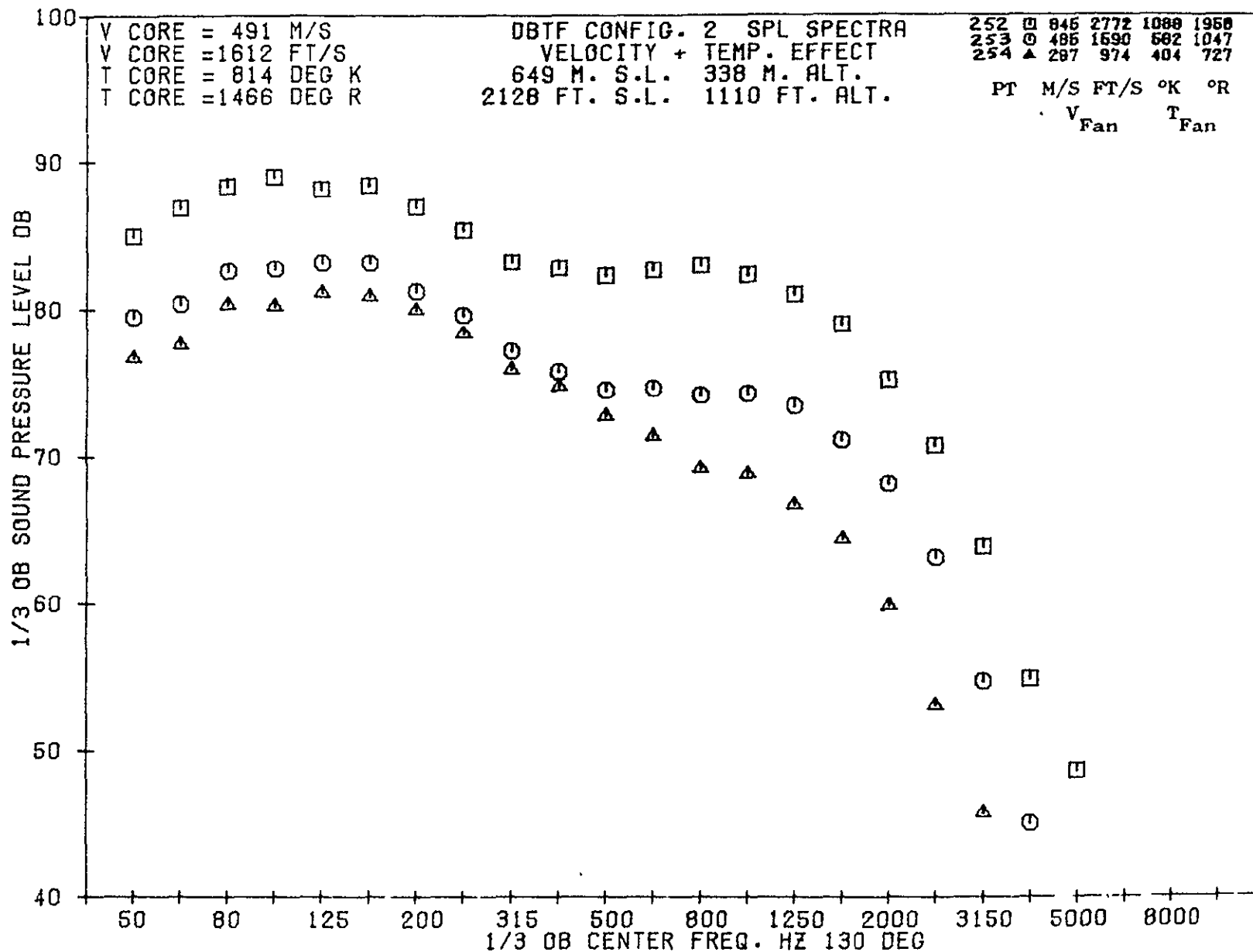


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79 BURCH A.

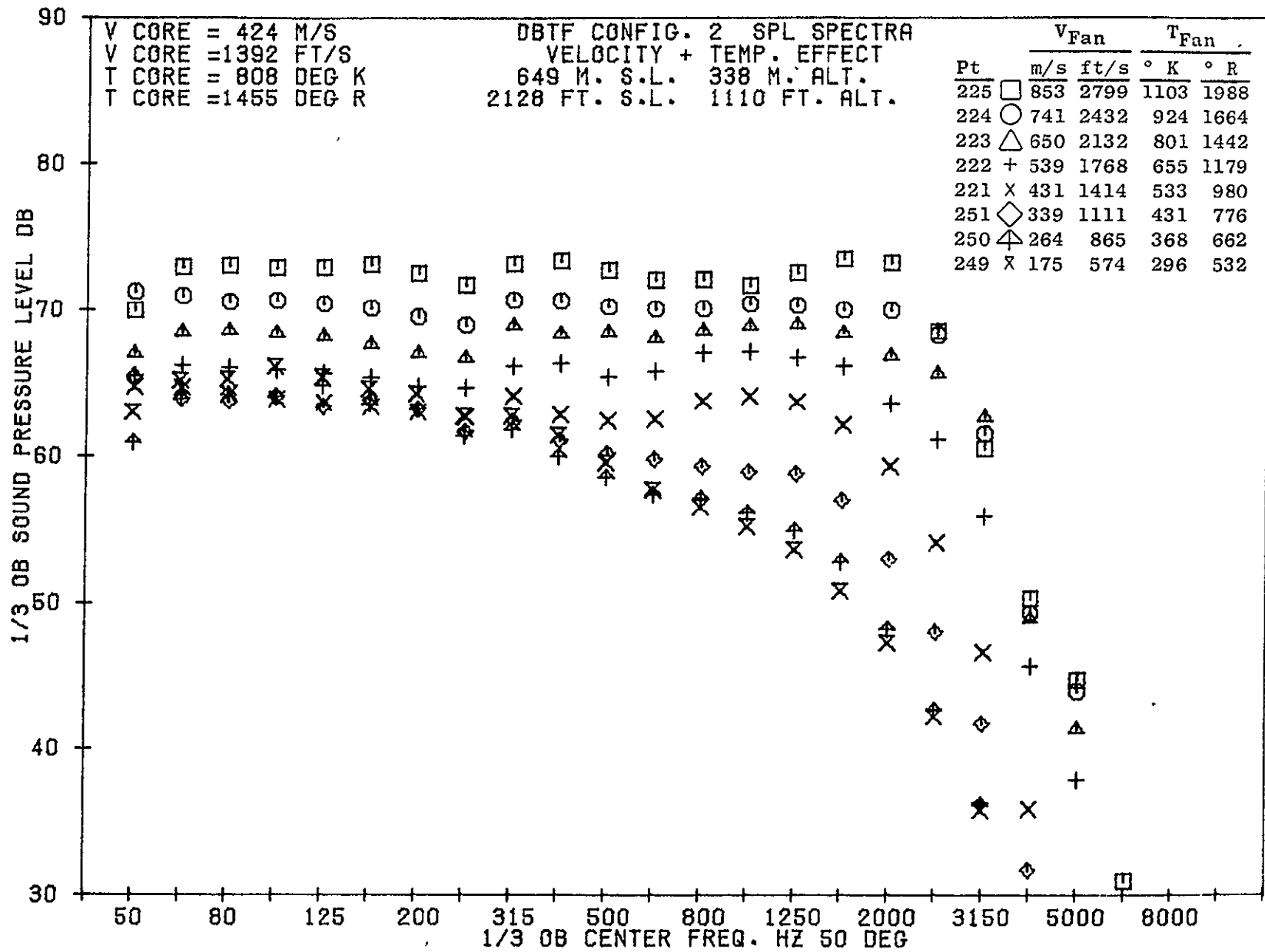
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4-156

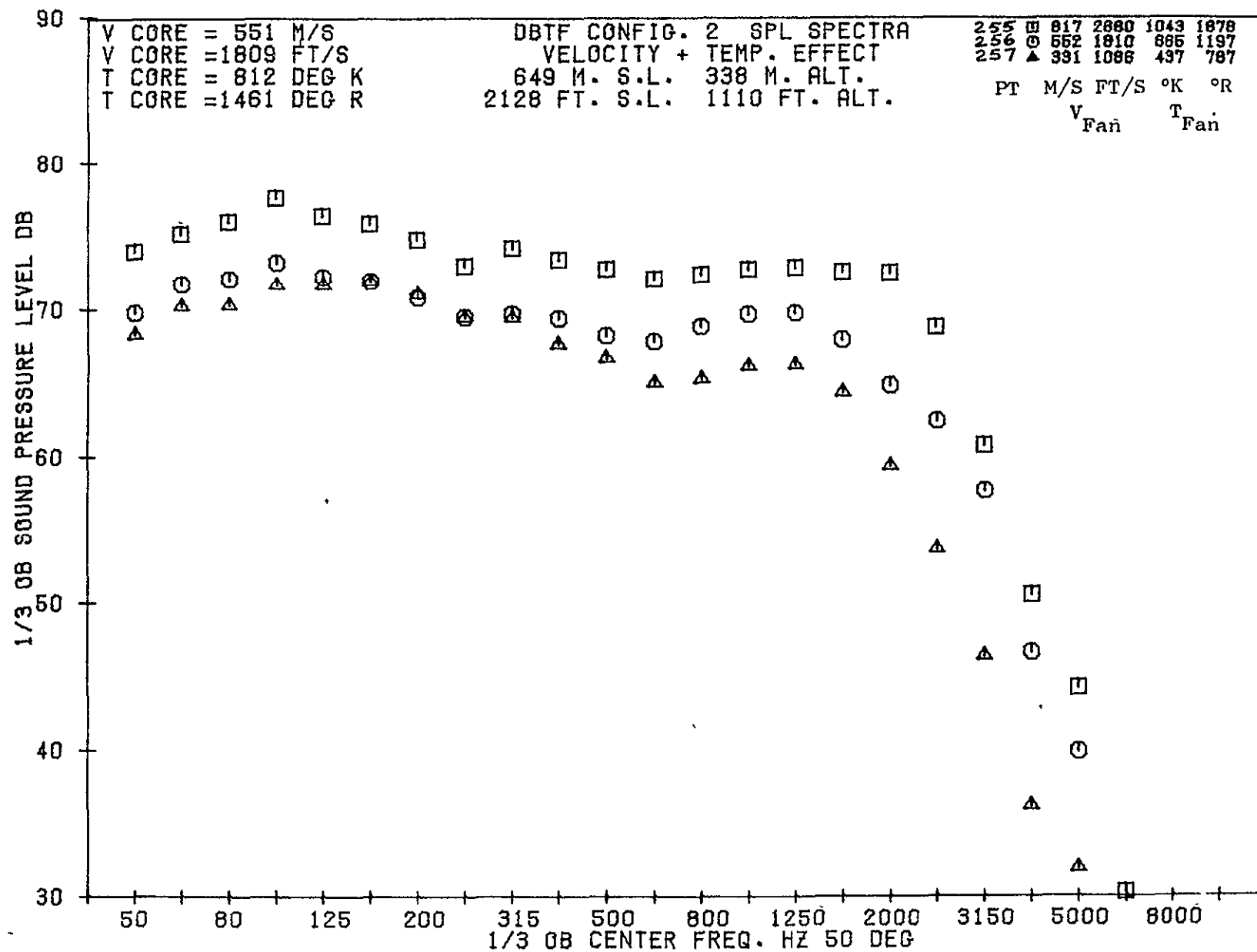
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5R032-001

79 BURCH A.



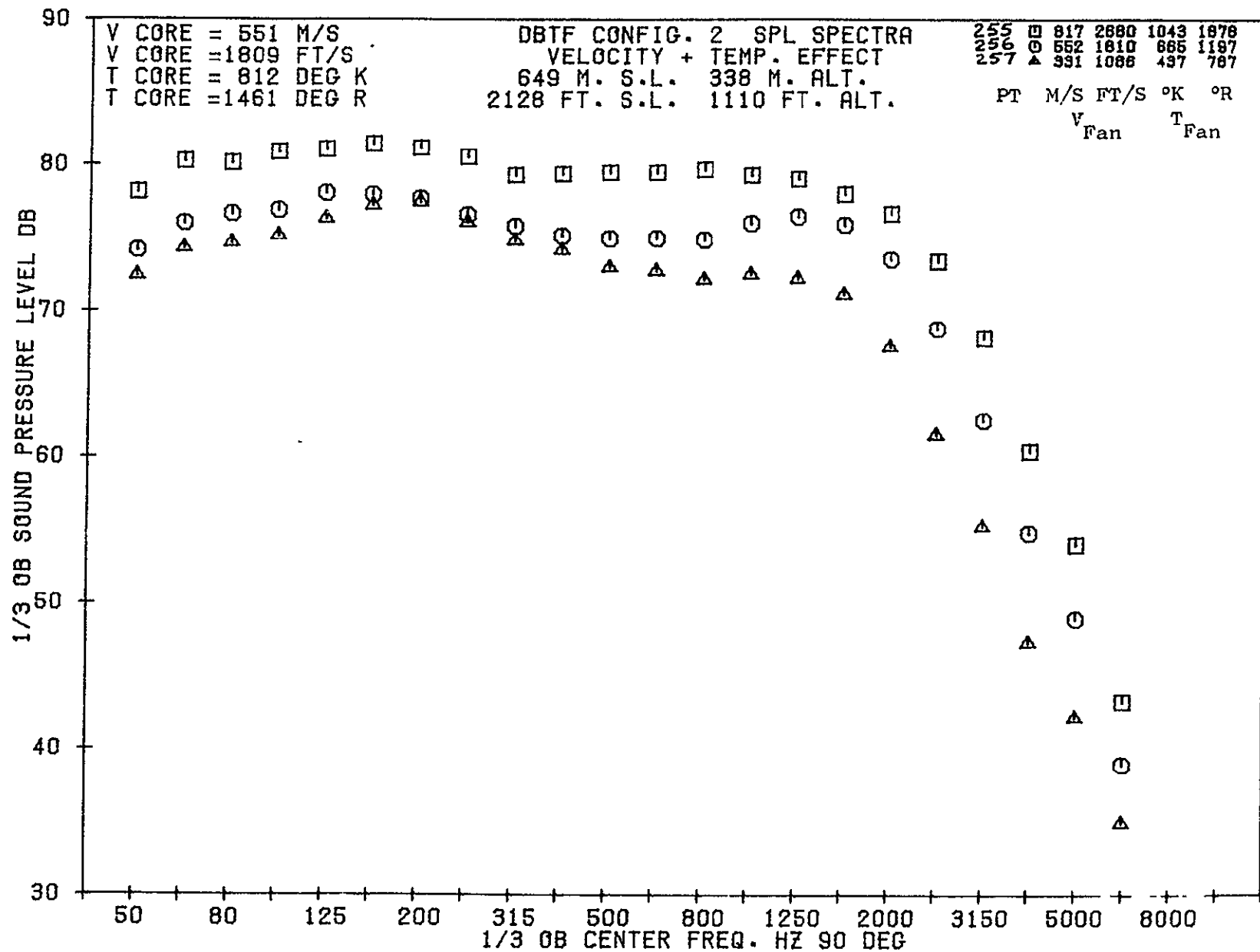
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1390



08/18/75
5R266-001

79 AIRCRAFT

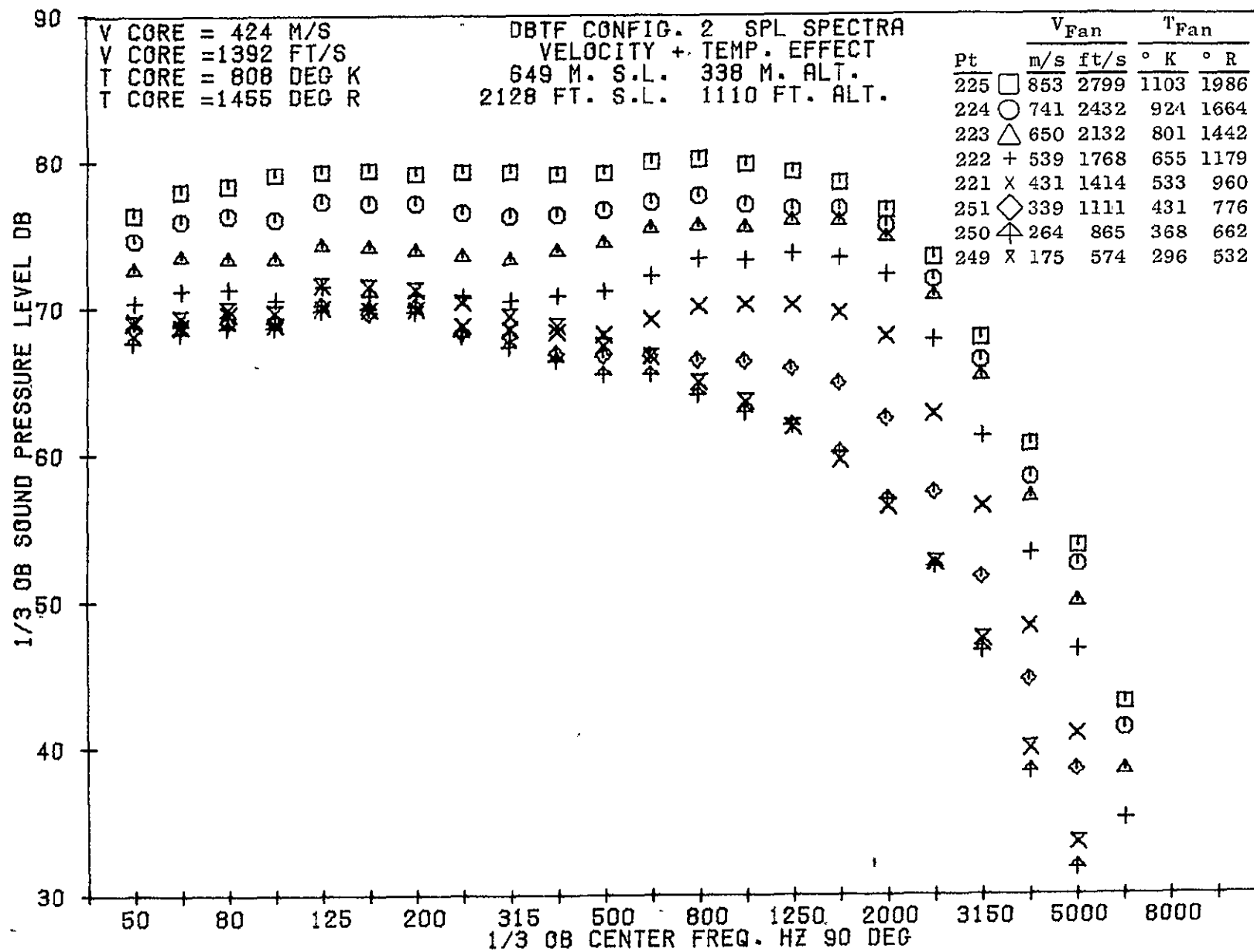


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5R266-001

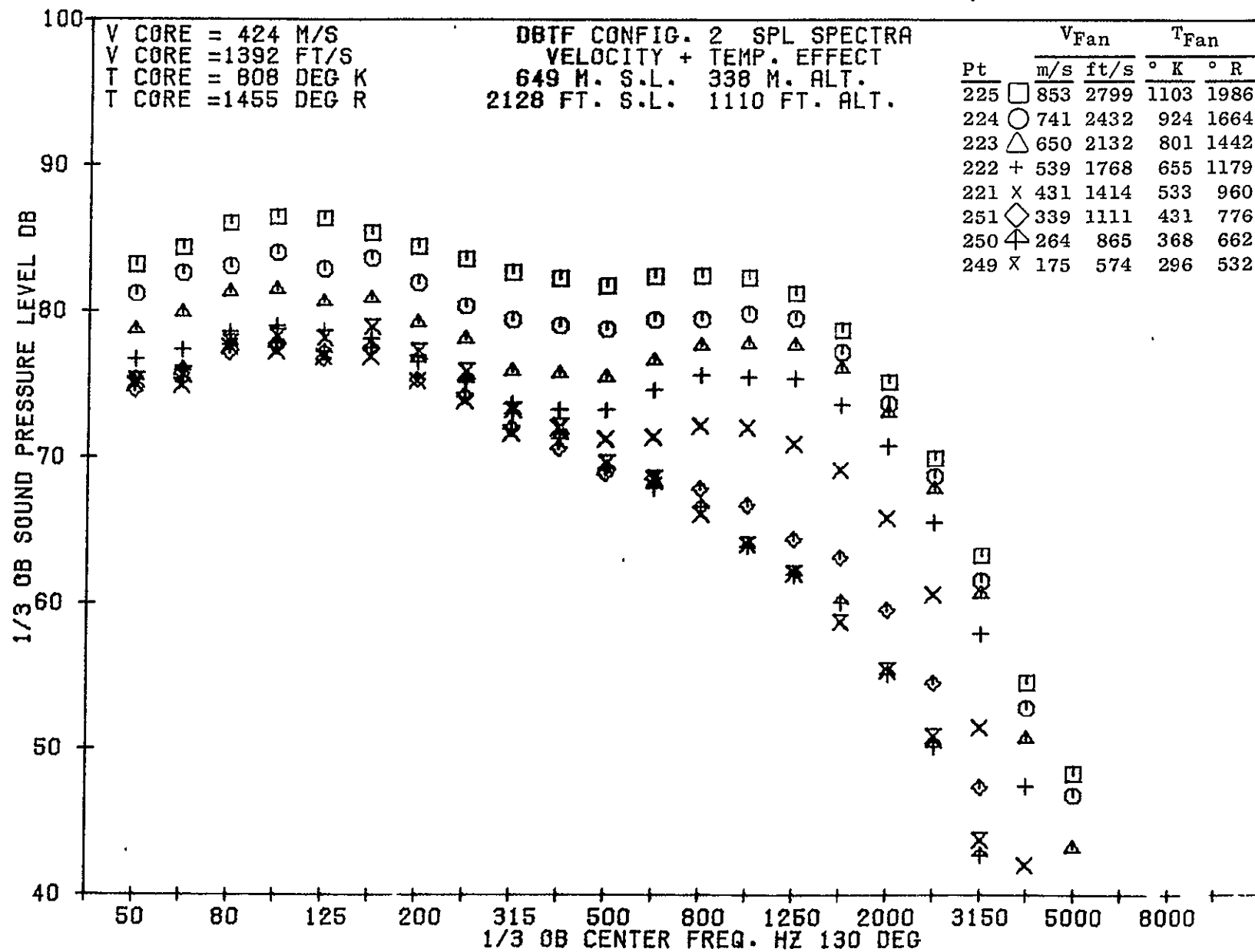
79 BURCH A.

1392

08/18/75
5R266-001

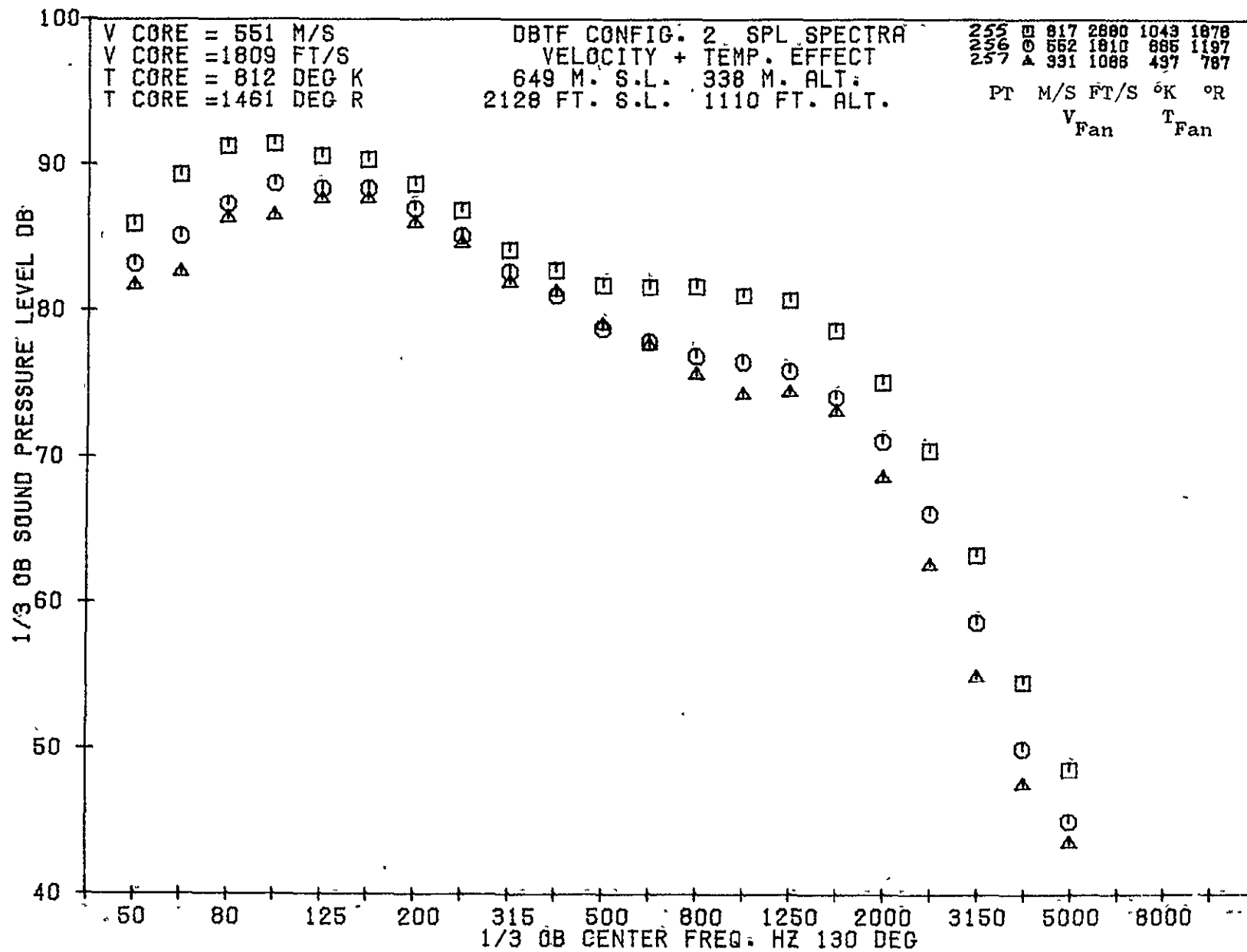
79. BURCH

1393

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BR266-001

79 BURCH A.

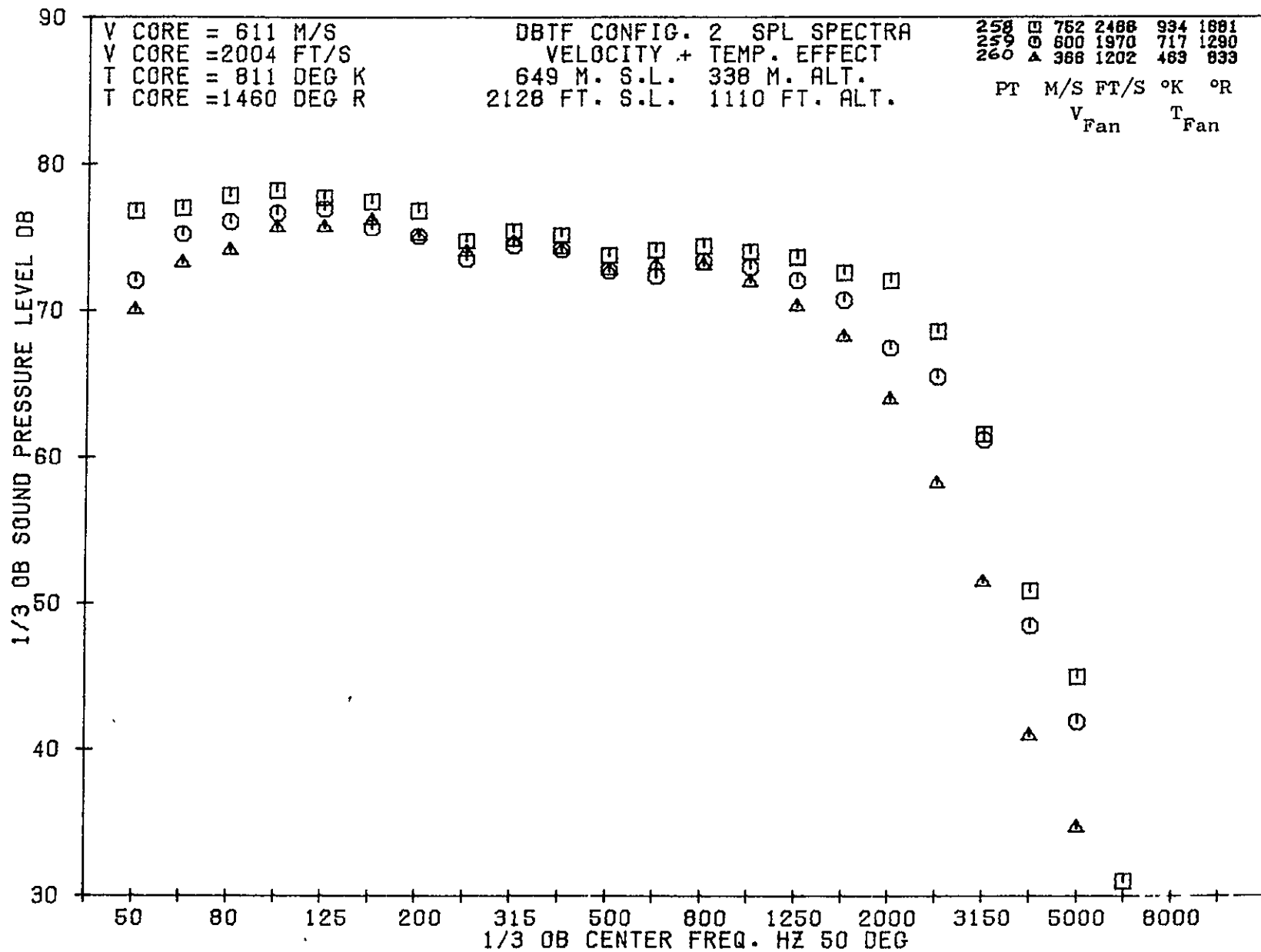
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08/18/75
5R266-001

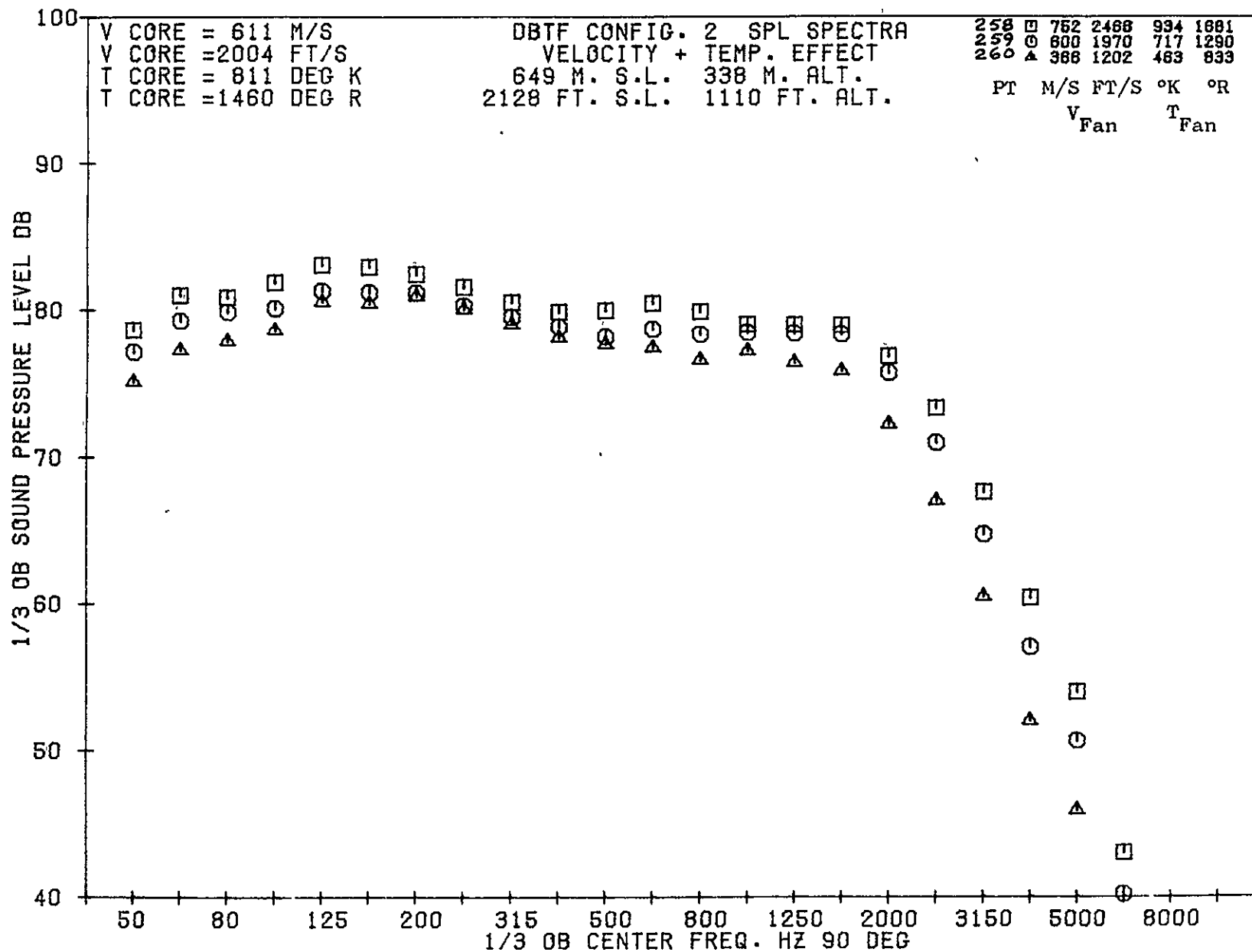
79 BURD A.

1395

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5R032-001

79 BURCH A.

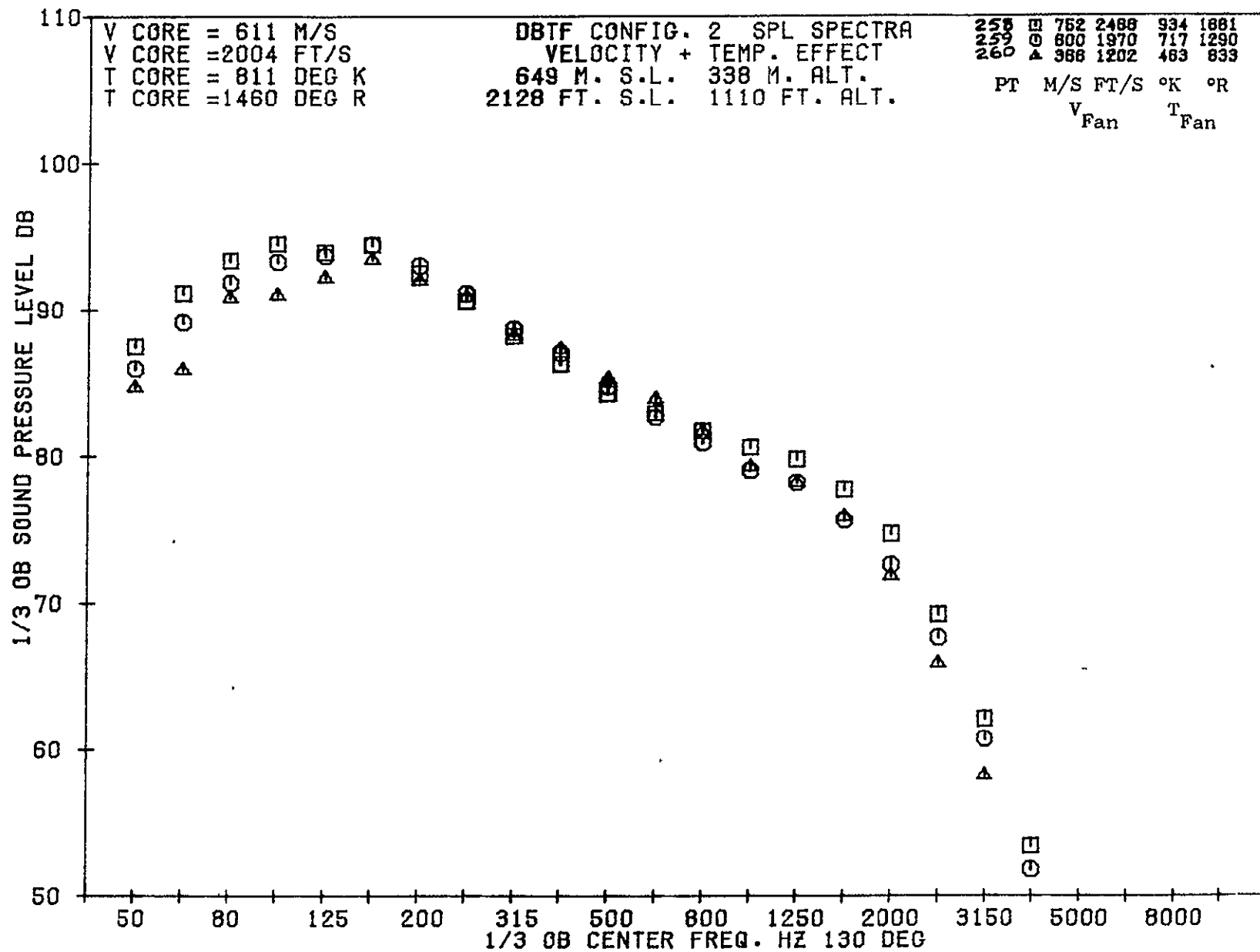
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08/13/75
5R032-001

79 BURC

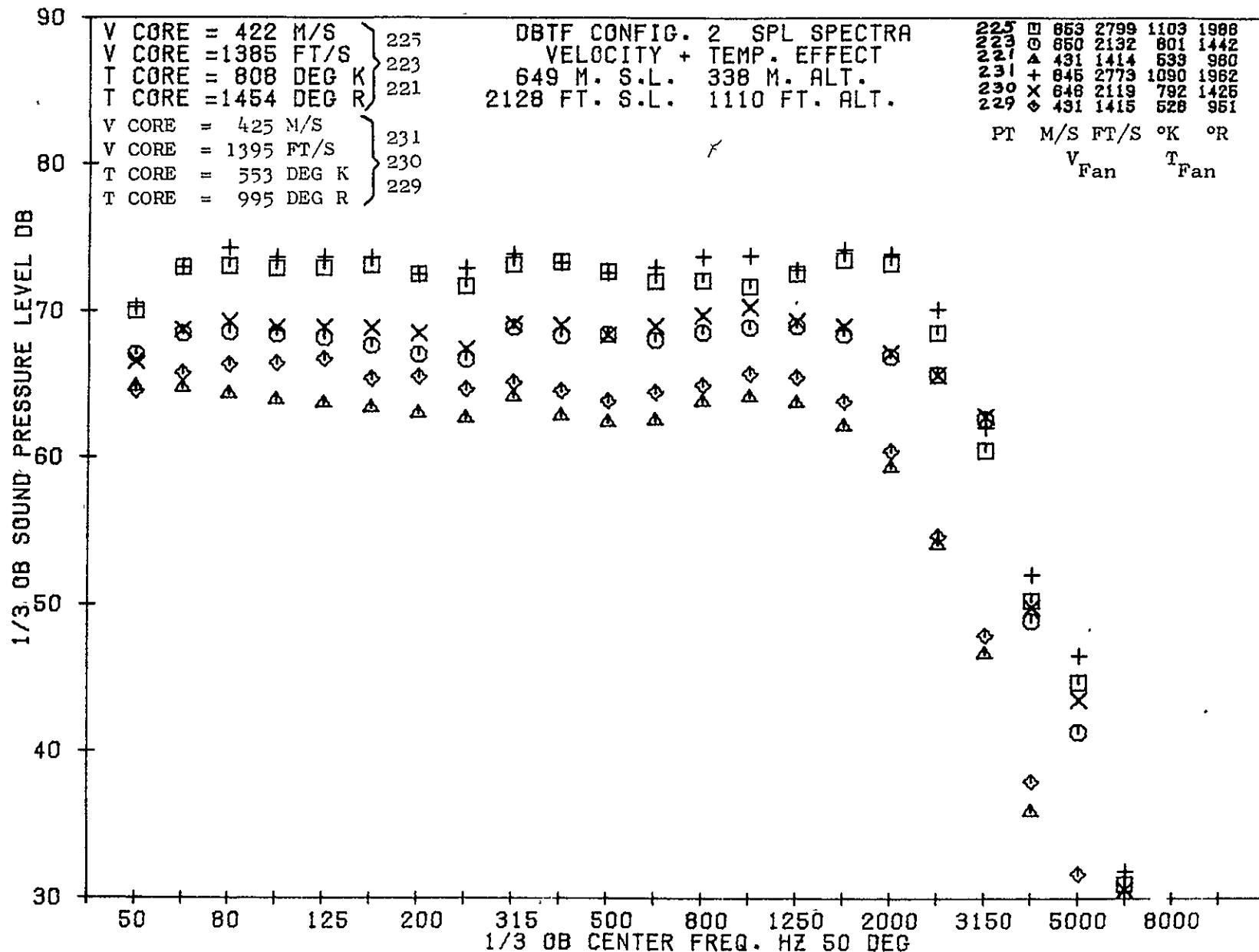
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 5R032-001

79 BURCH A.

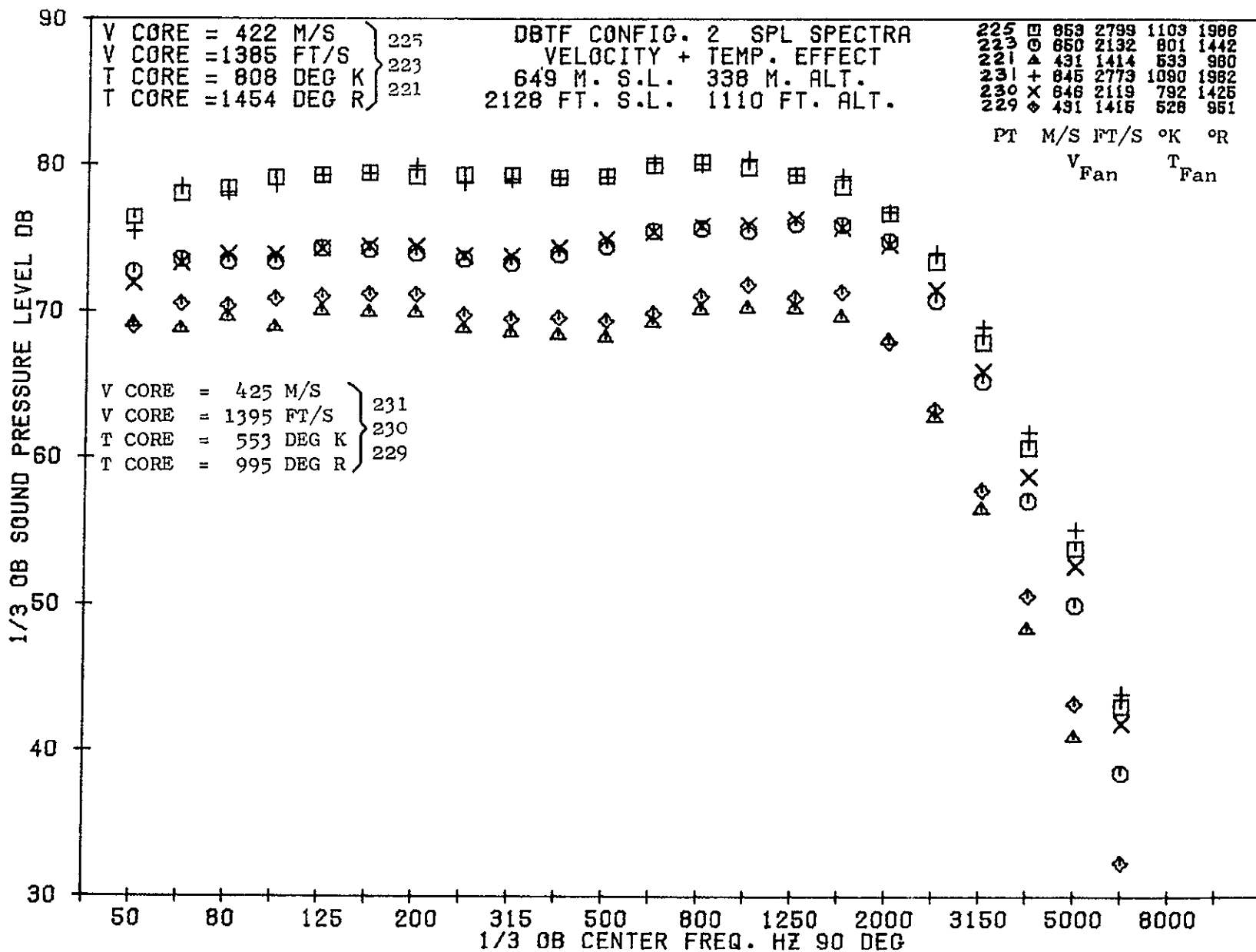
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08/13/75
5R032-001

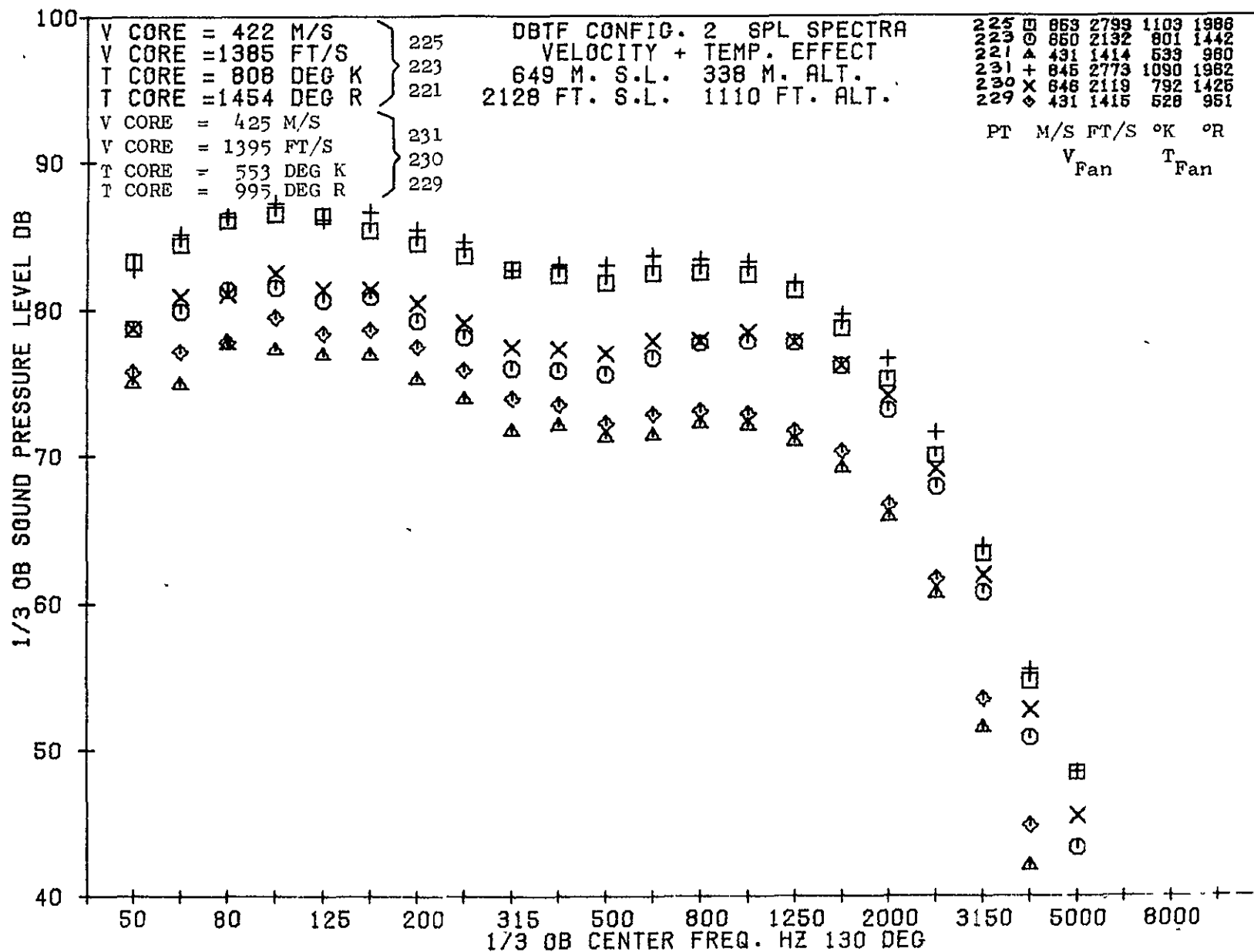
79 BURC

1399

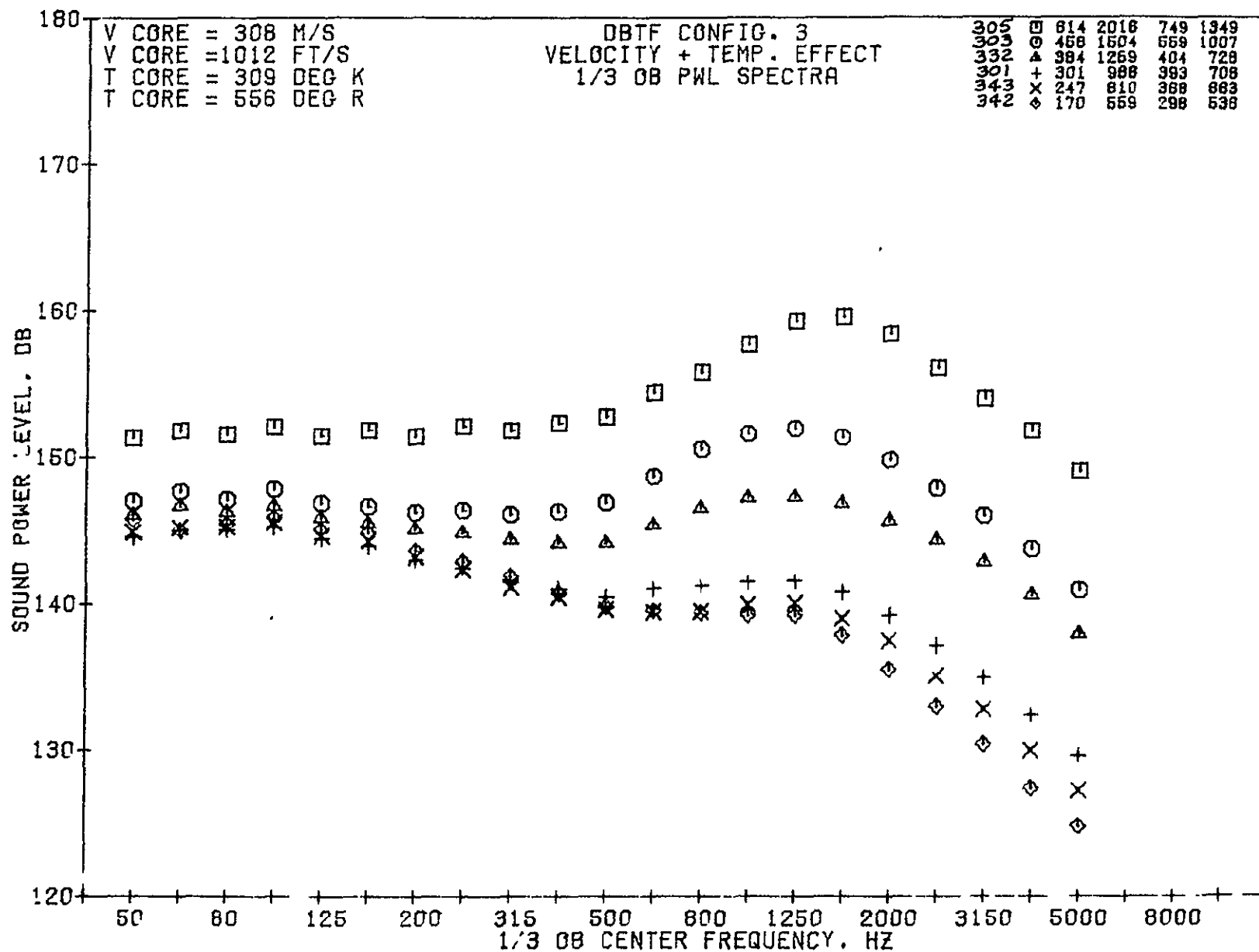
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5R032-001

79 BURCH A.

1400

08/13/75
5R032-001

79 BURCH



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08/13/75
5R960-001

79 BURCH A.

4-11-75

180

V CORE = 335 M/S
 V CORE = 1099 FT/S
 T CORE = 429 DEG K
 T CORE = 773 DEG R

DBTF CONFIG. 3
 VELOCITY + TEMP. EFFECT
 1/3 OB PWL SPECTRA

310	689	2194	819	1474
306	500	1641	598	1077
306	331	1067	424	789

PT	M/S	FT/S	°K	°R
	V _{Fan}		T _{Fan}	

SOUND POWER LEVEL, DB

170

160

150

140

130

120

50

80

125

200

315

500

800

1250

2000

3150

5000

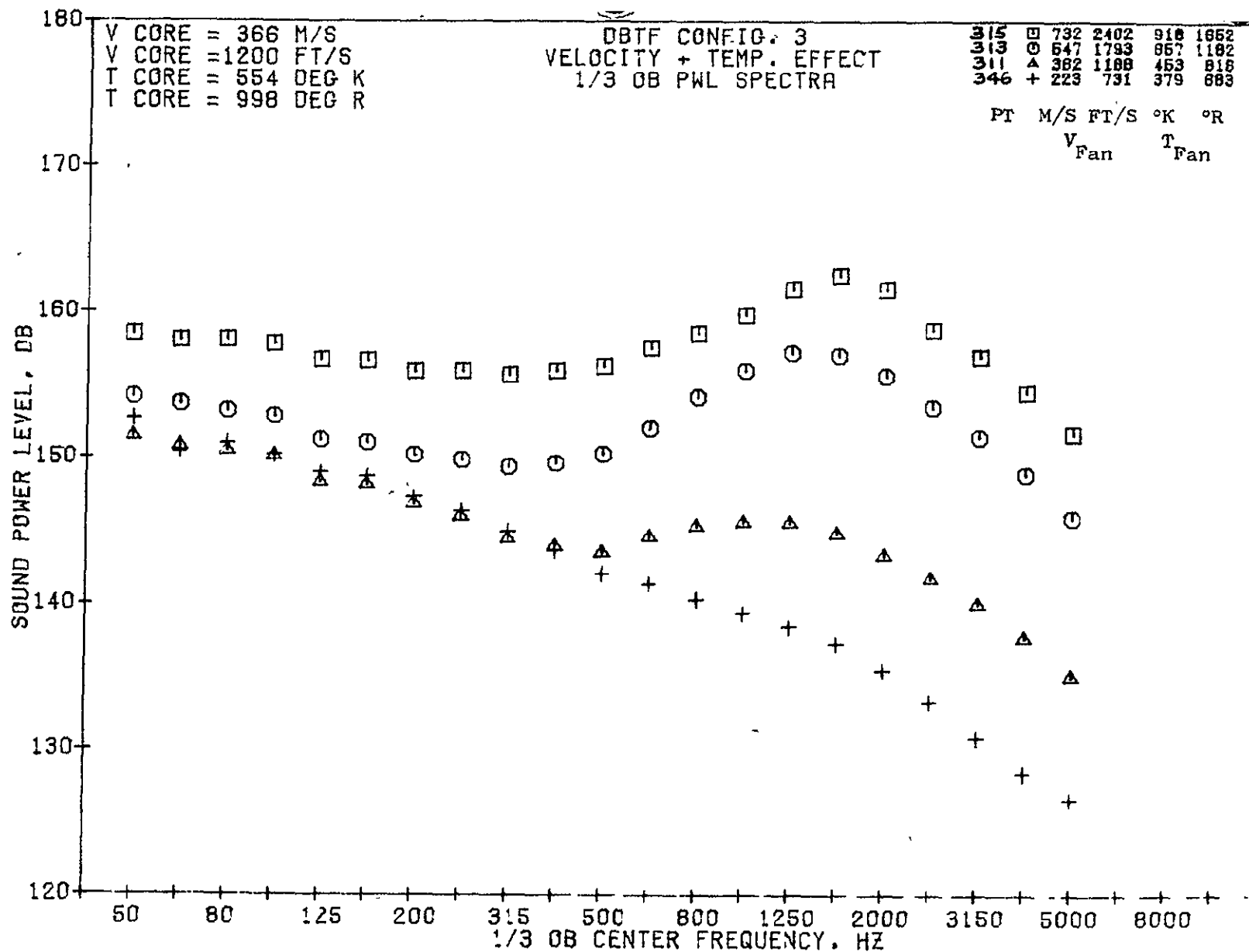
8000

1/3 OB CENTER FREQUENCY, HZ

1402

08/13/75
 5R960-001

79 BURCH 9.

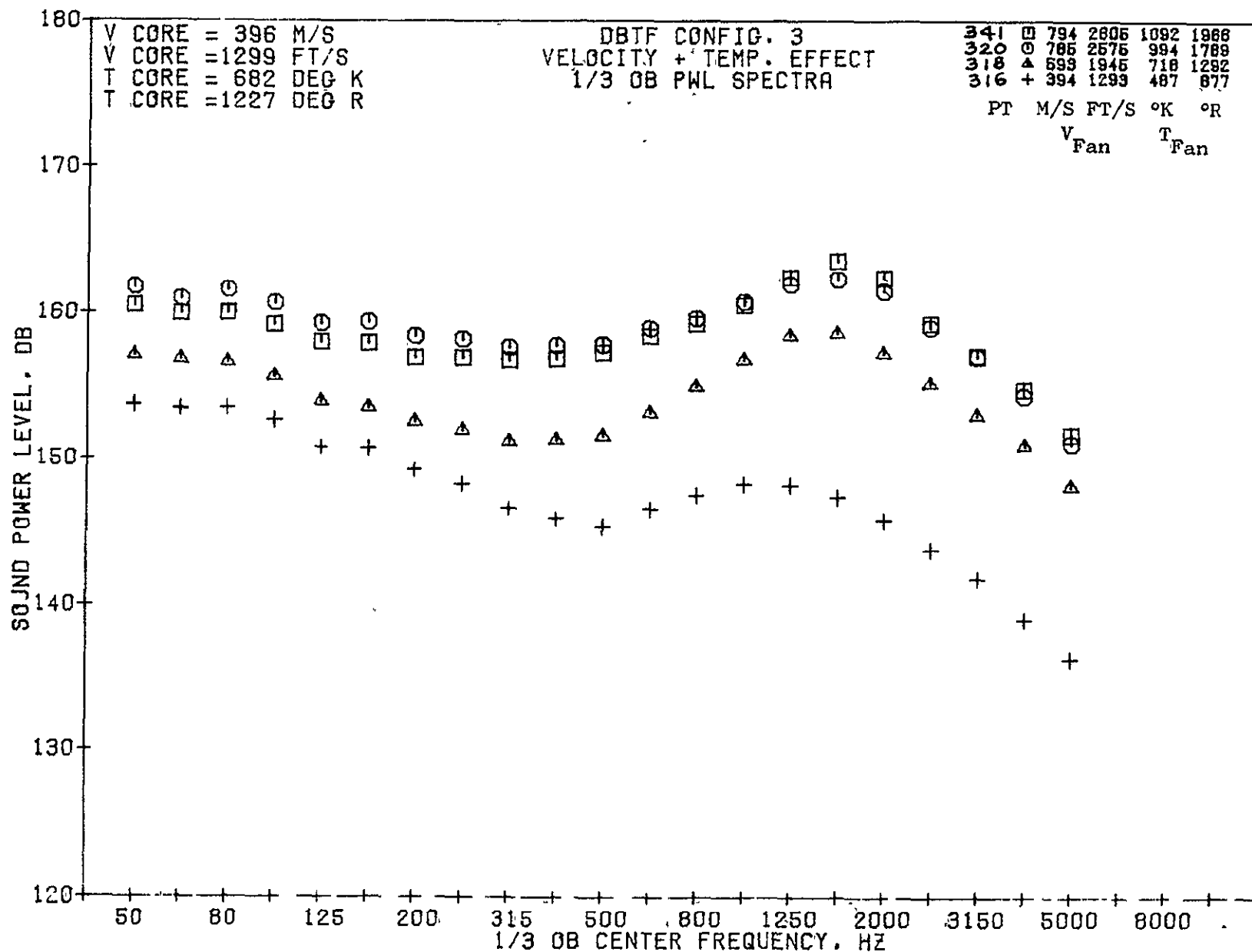


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08/13/75
5R960-001

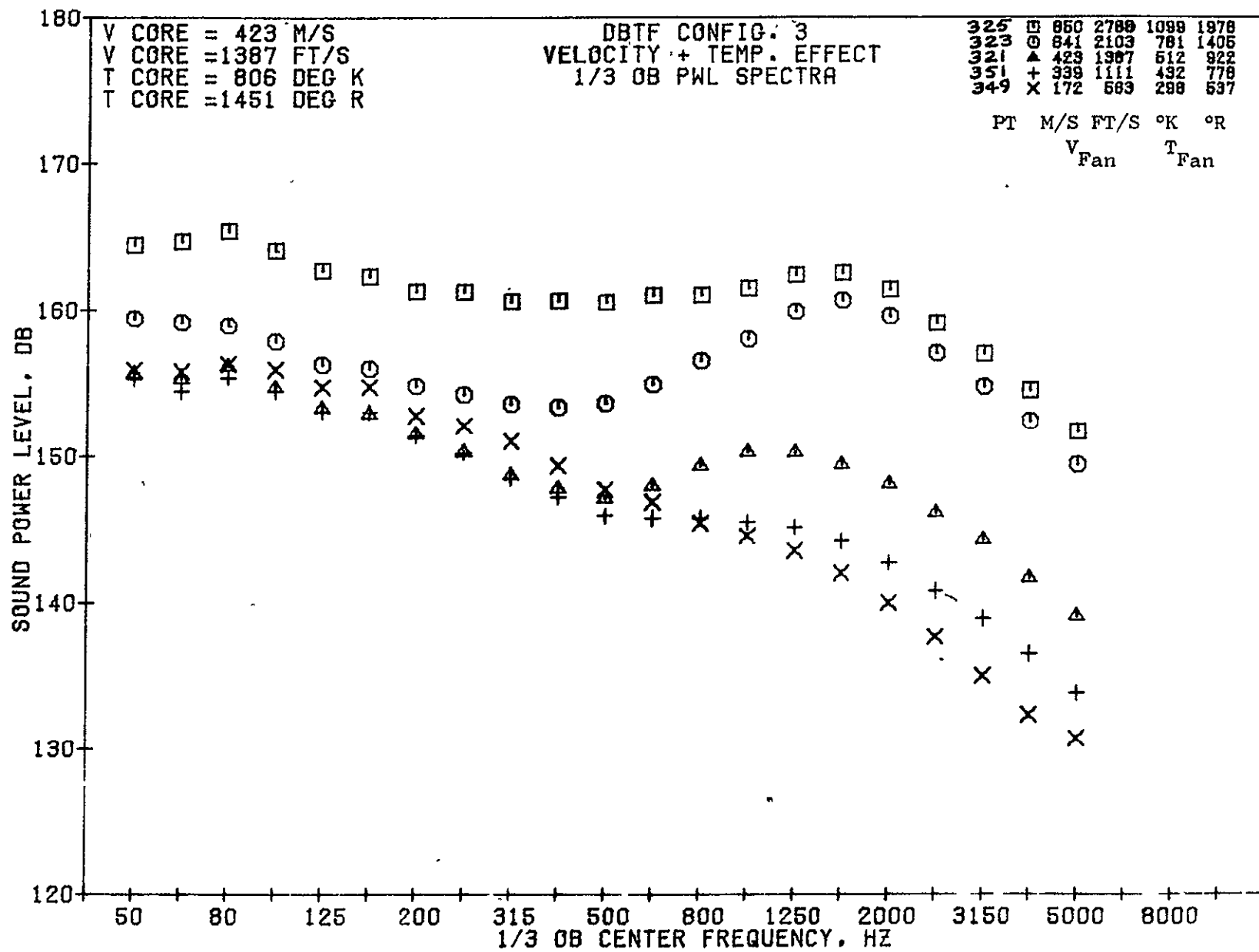
79 BURCH A.

4-168



08/13/75
5R960-001

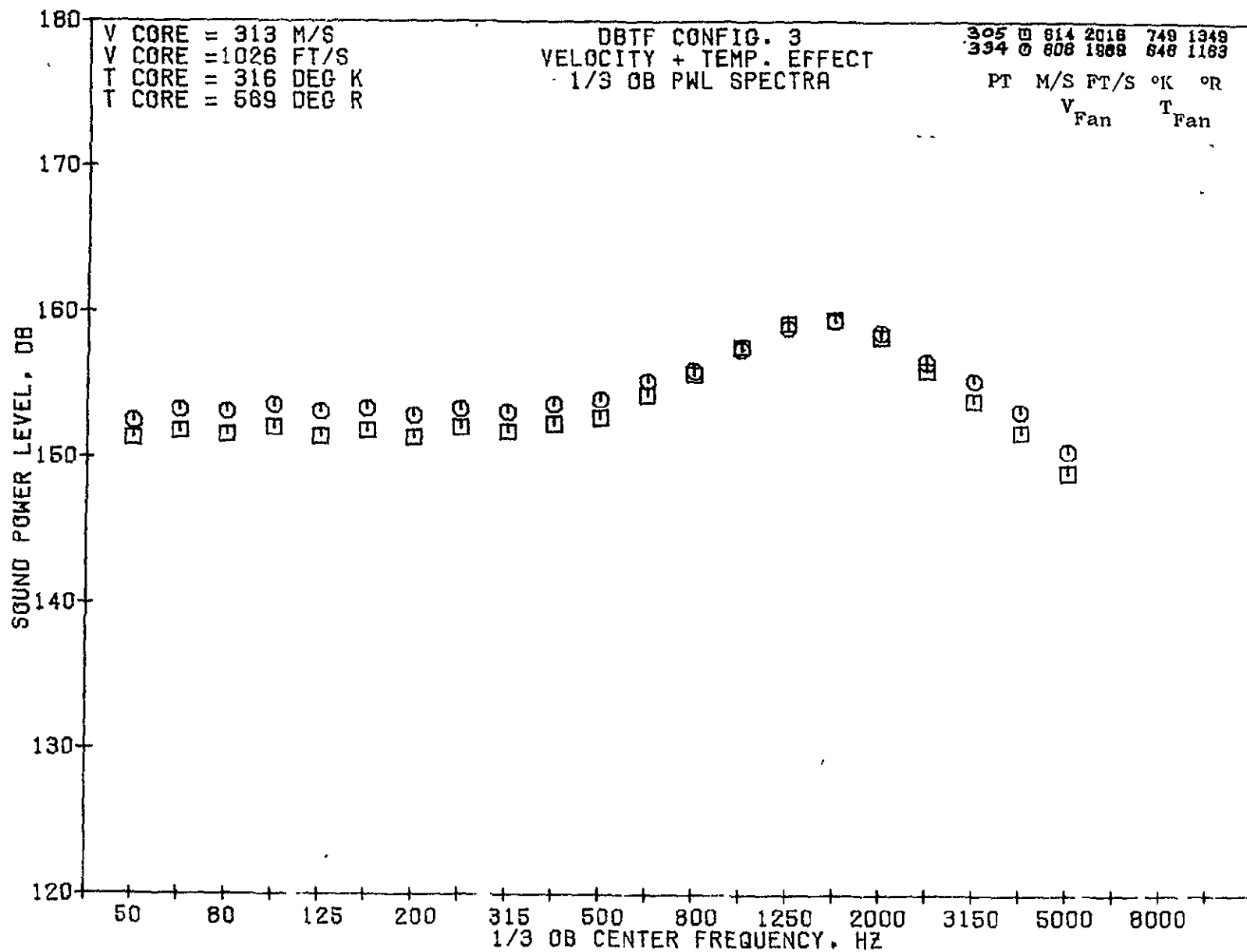
79 BUR A.



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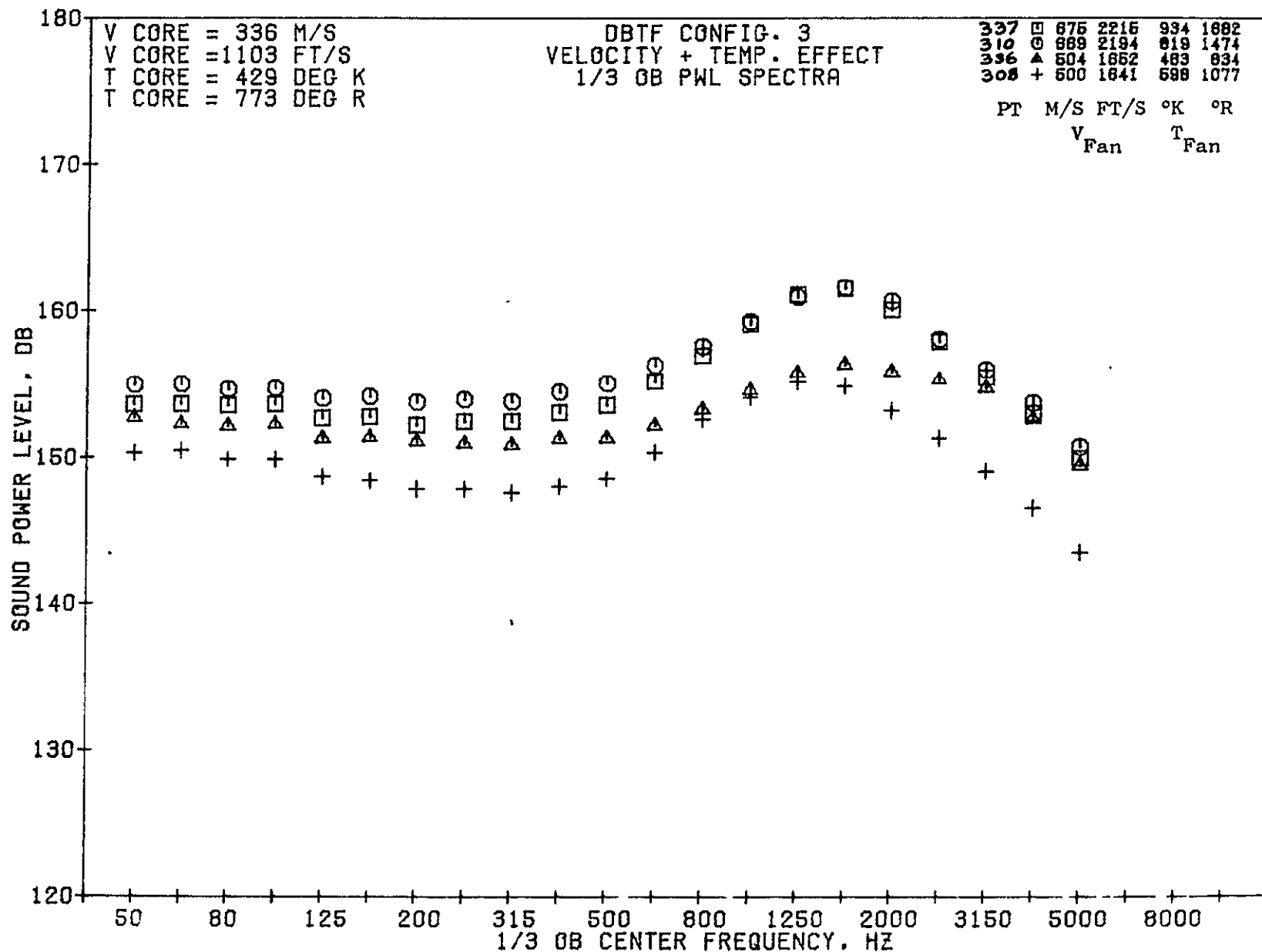
617

1406



08/13/75
 5R960-001

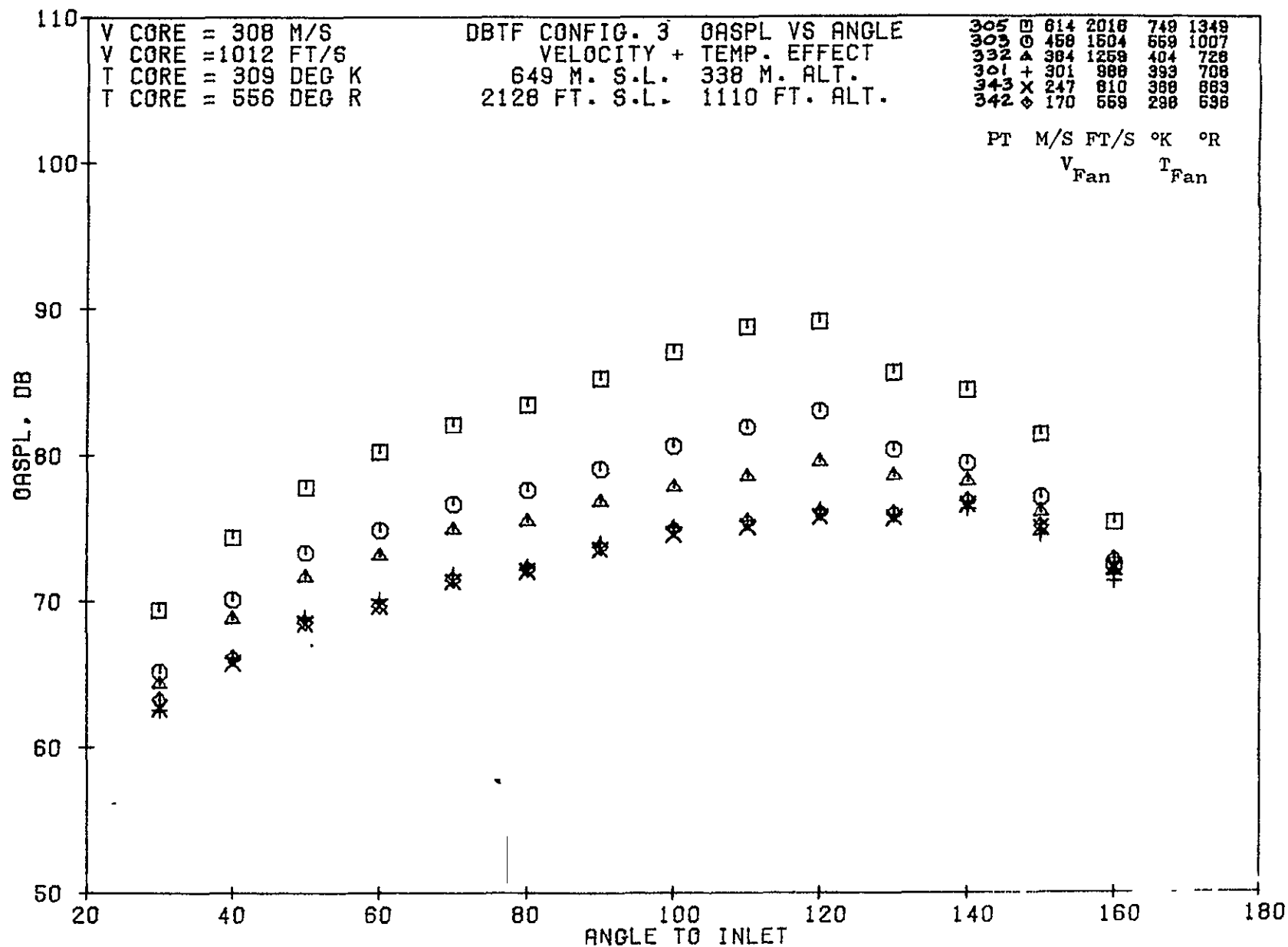
79 BURCH A.



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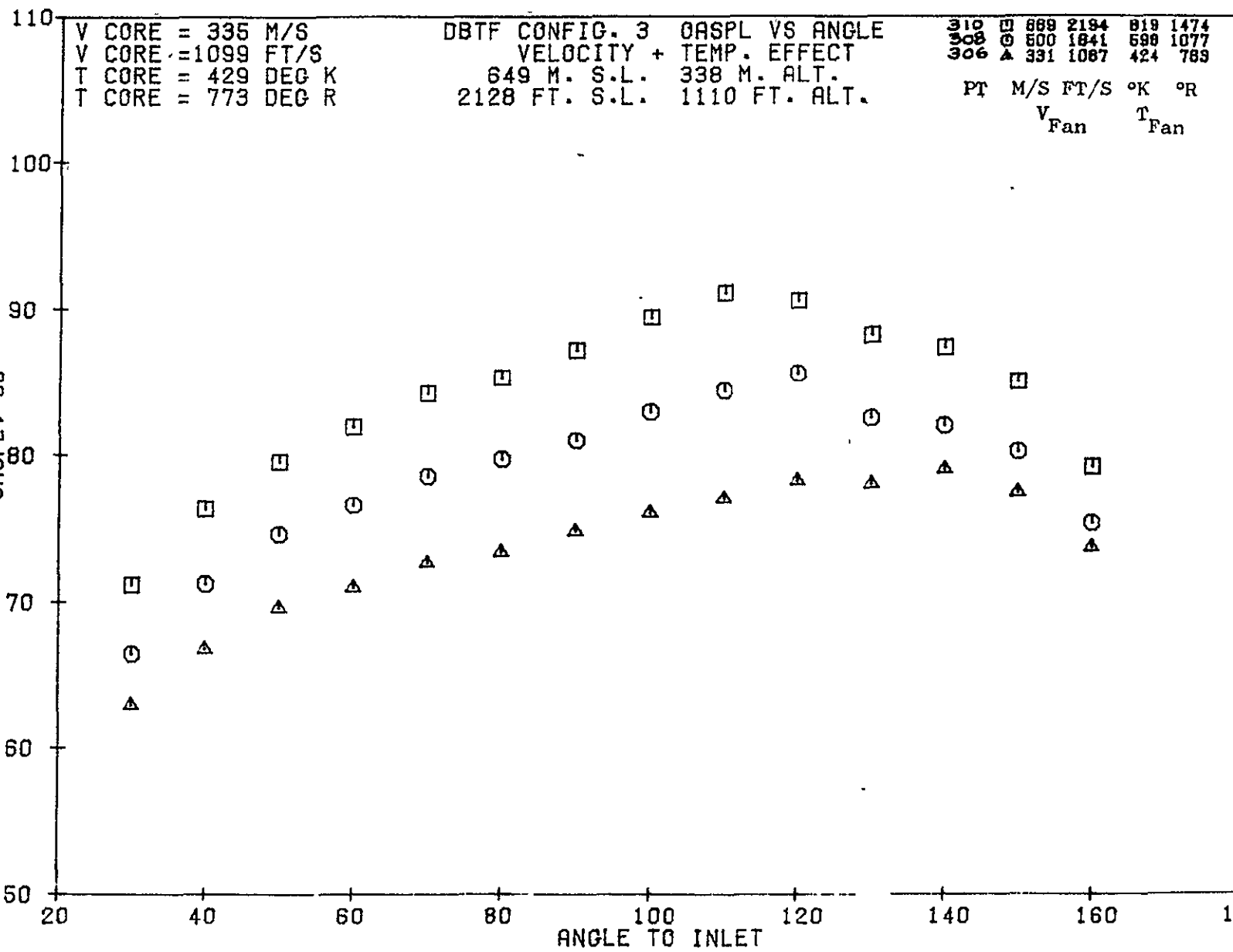
08/13/75
5R960-001

79 BURCH A.



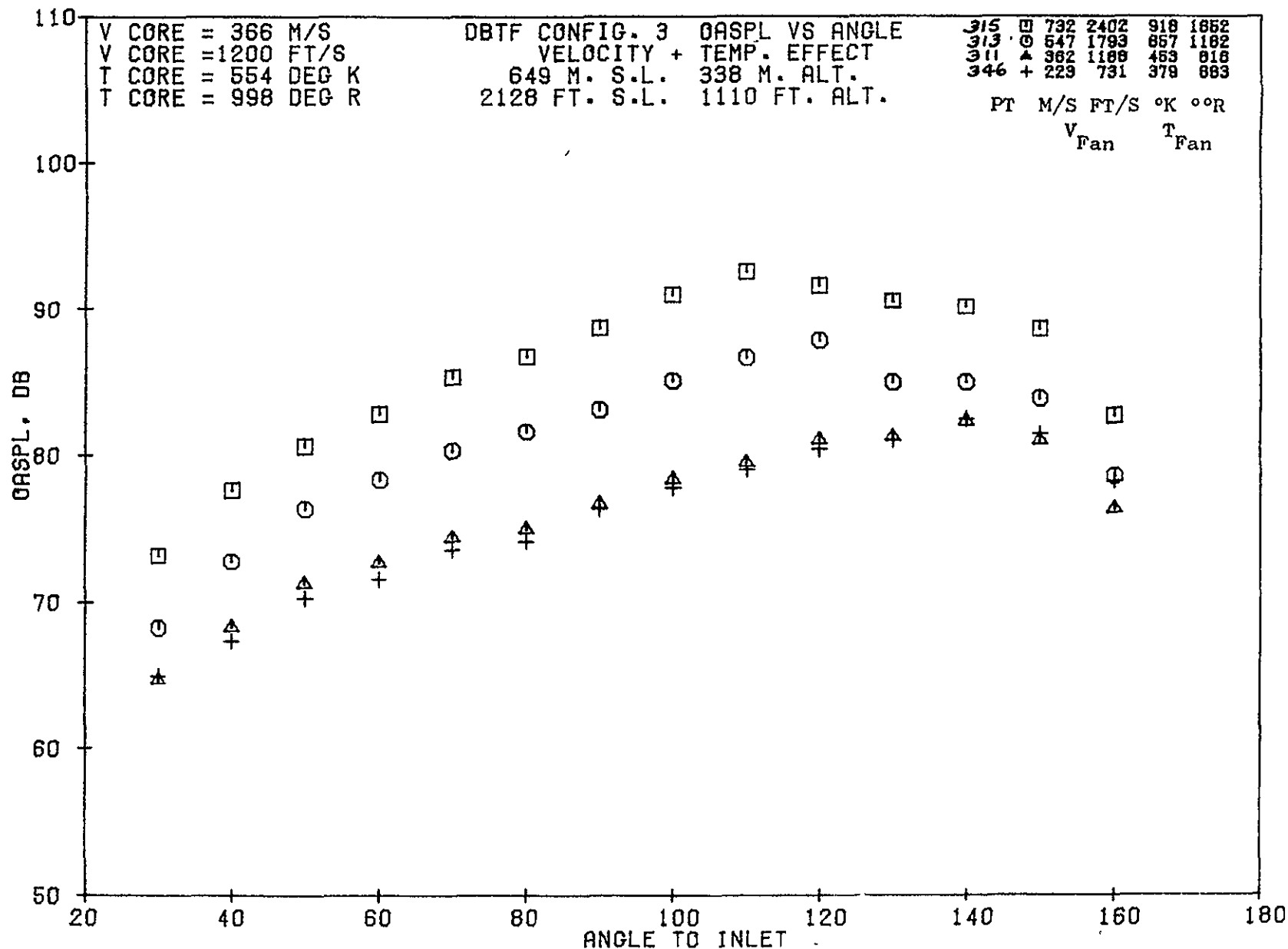
08/13/75
5R960-001

79 BURCH



1409

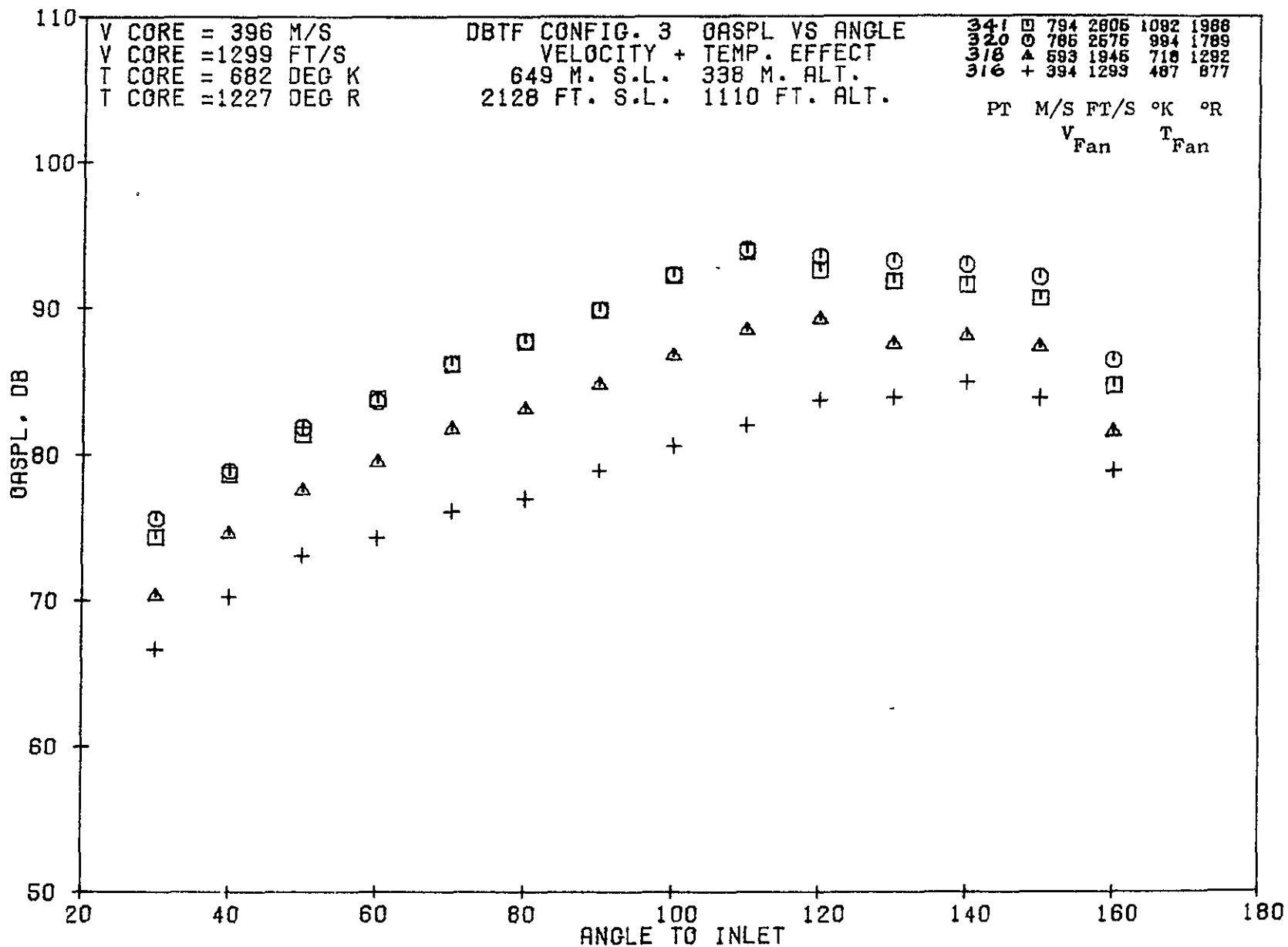
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08/13/75
5R960-001

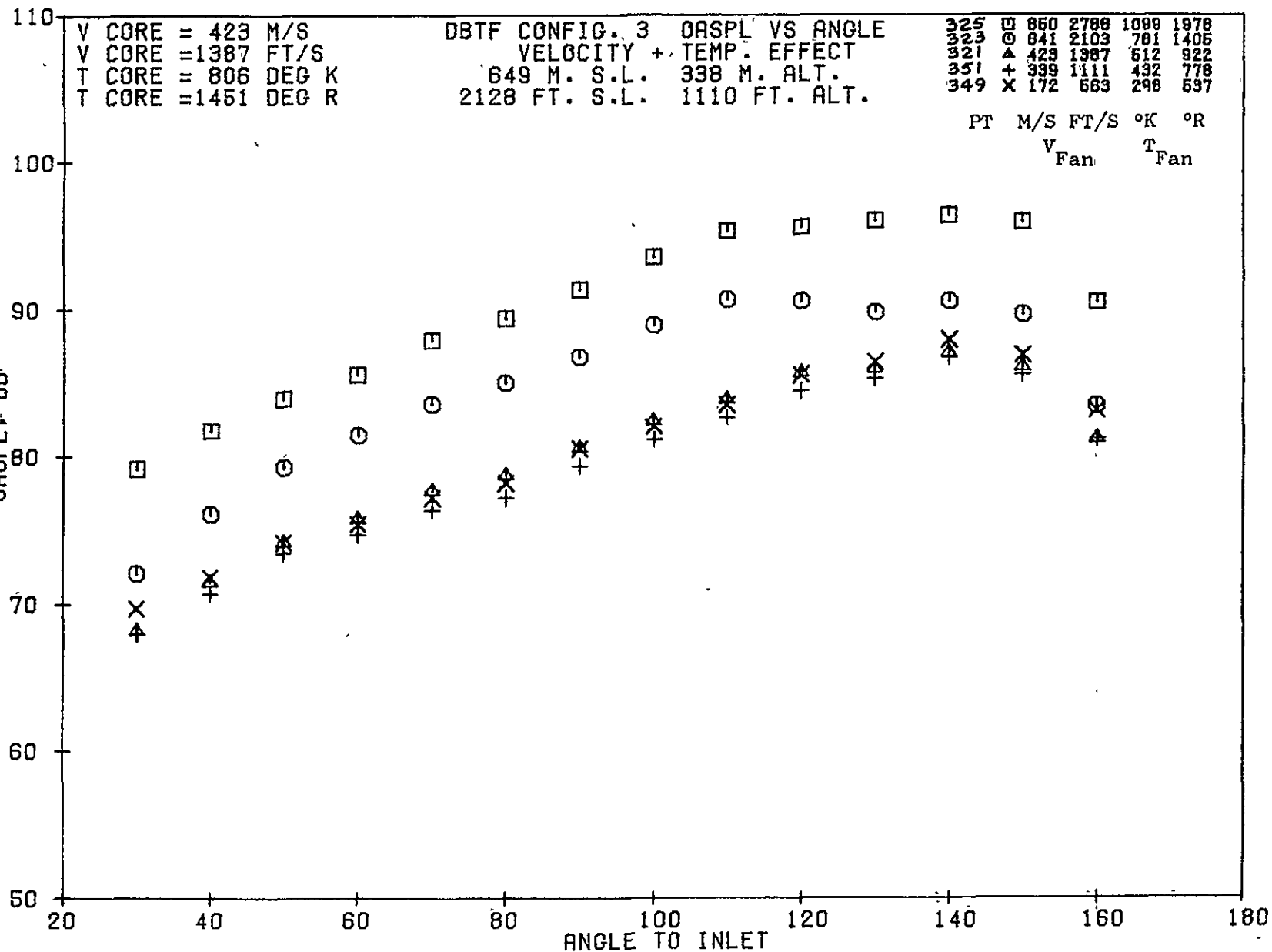
79 BURCH

1411


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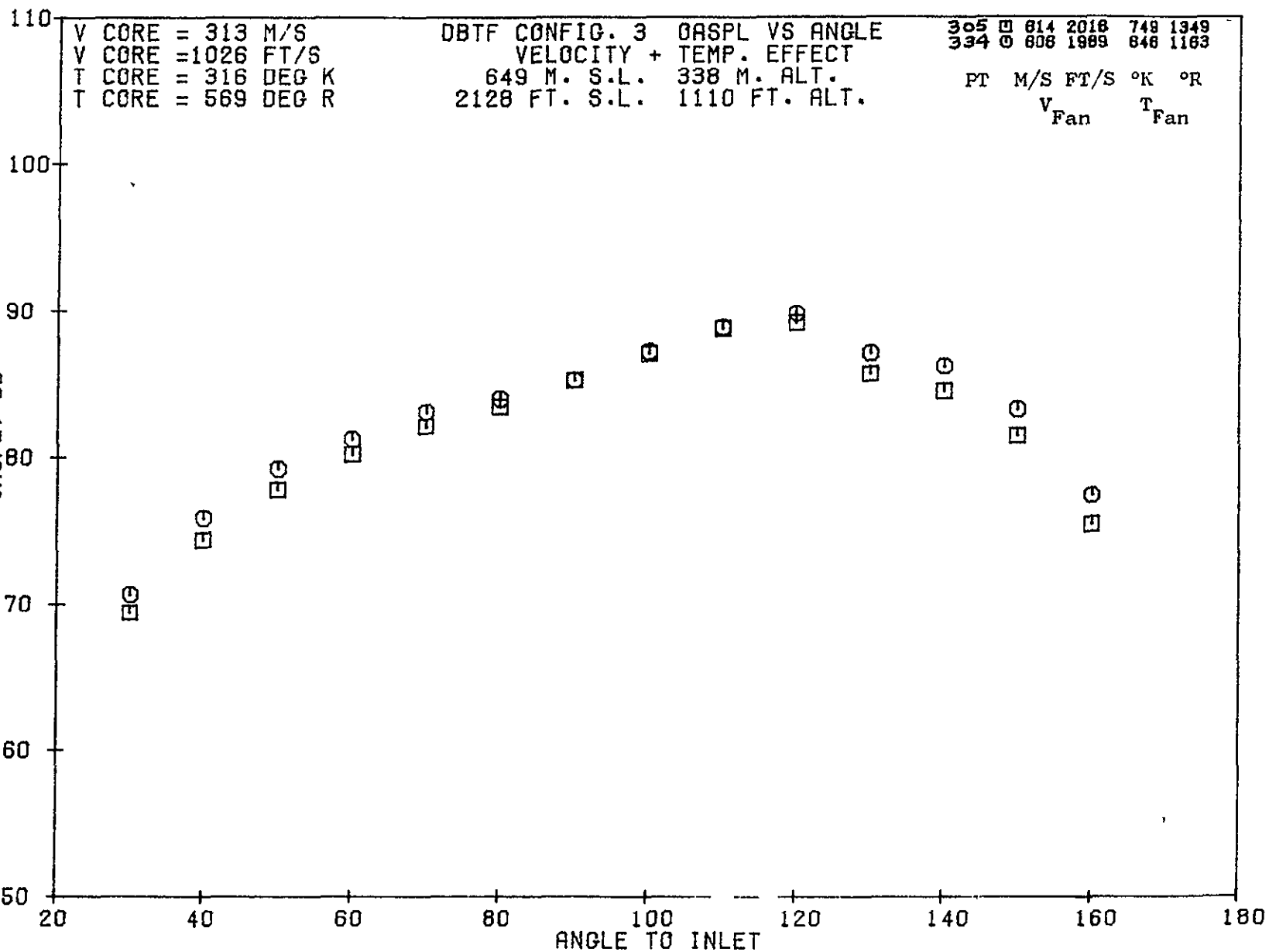
 08/13/75
 5R960-001

79 BURCH A.



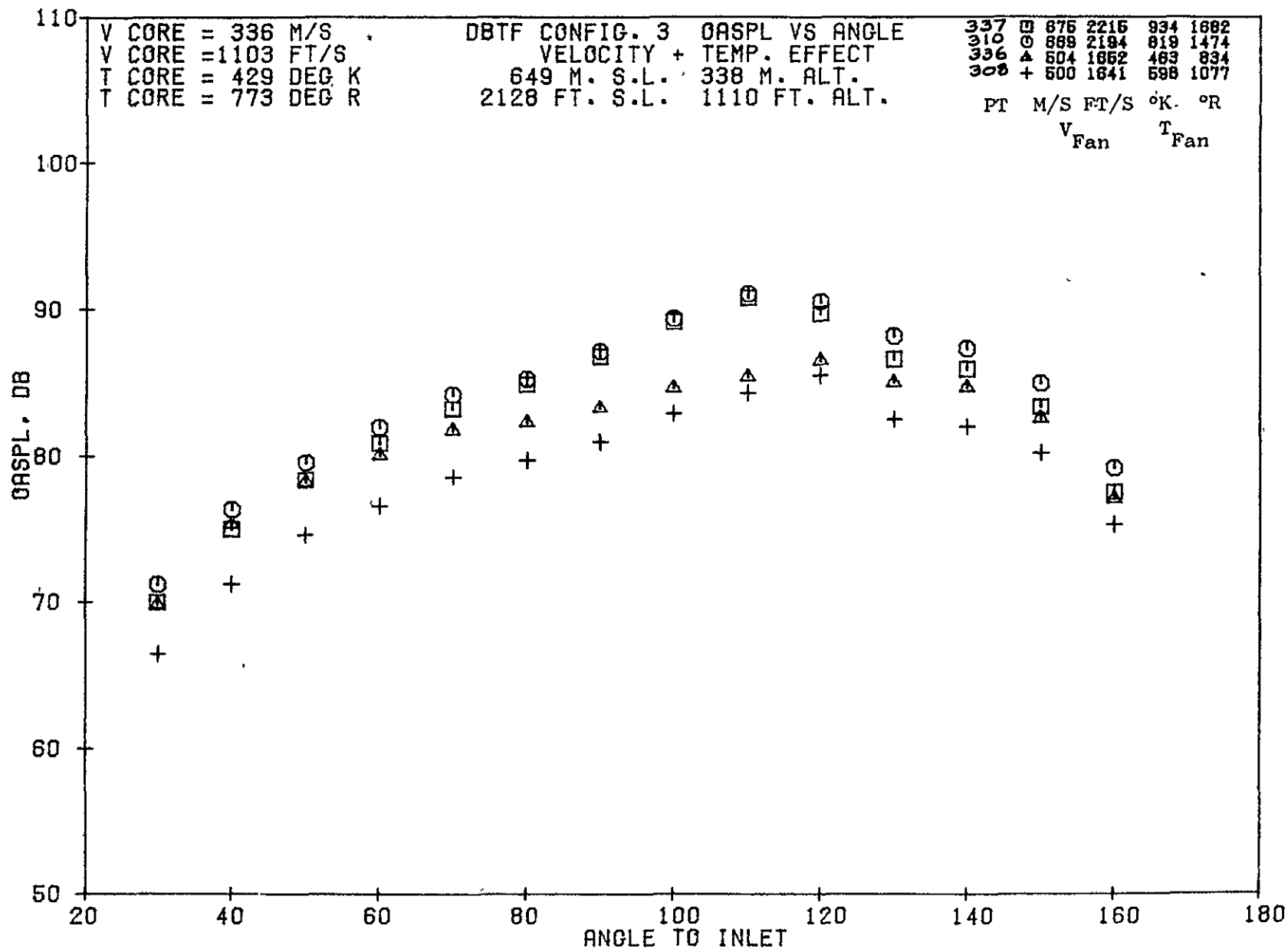
08/13/75
5R960-001

79 BURD



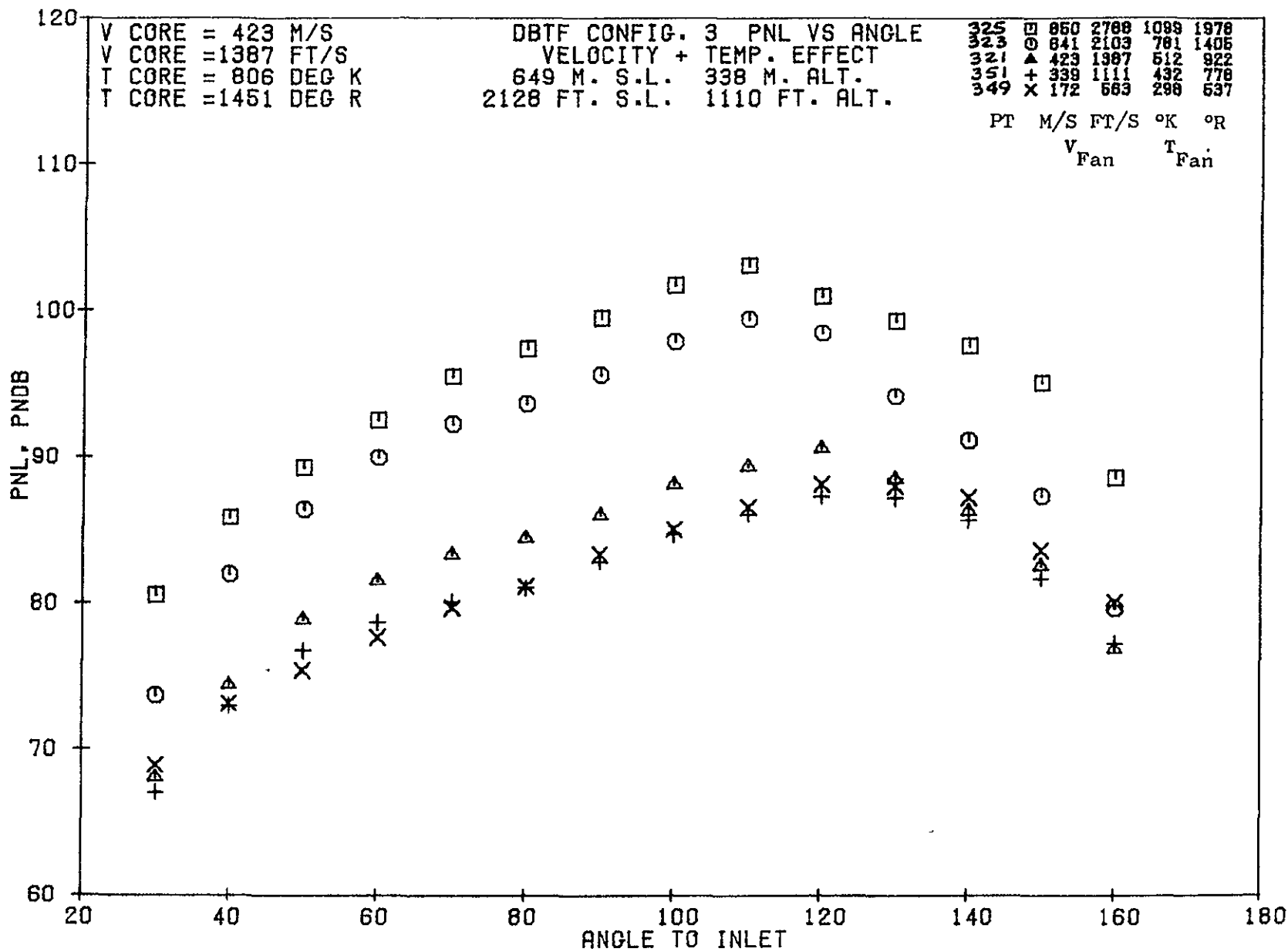
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1414



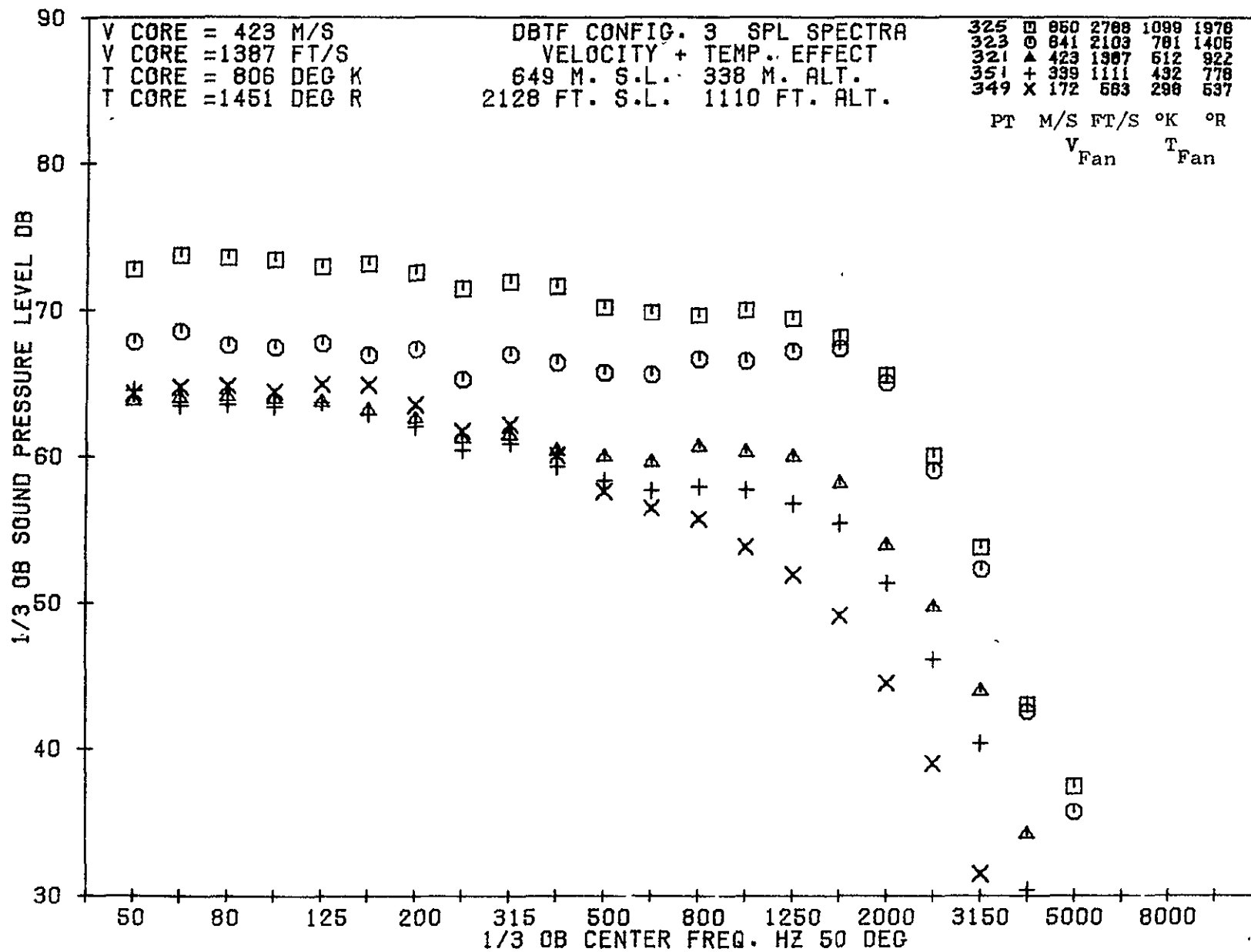
08/13/75
5R960-001

79 BURCH



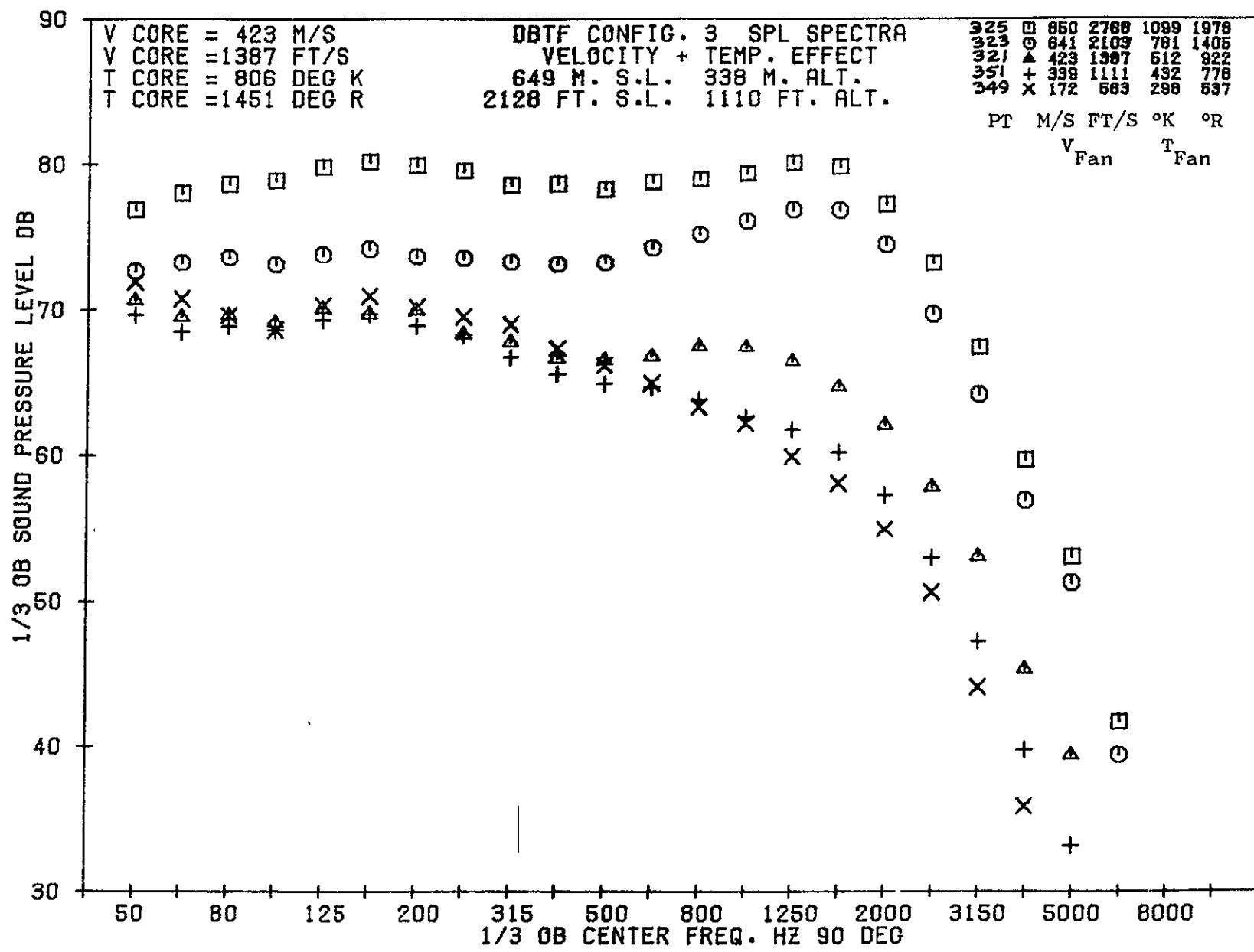
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1416



08/13/75
5R960-001

79 BURCH A.



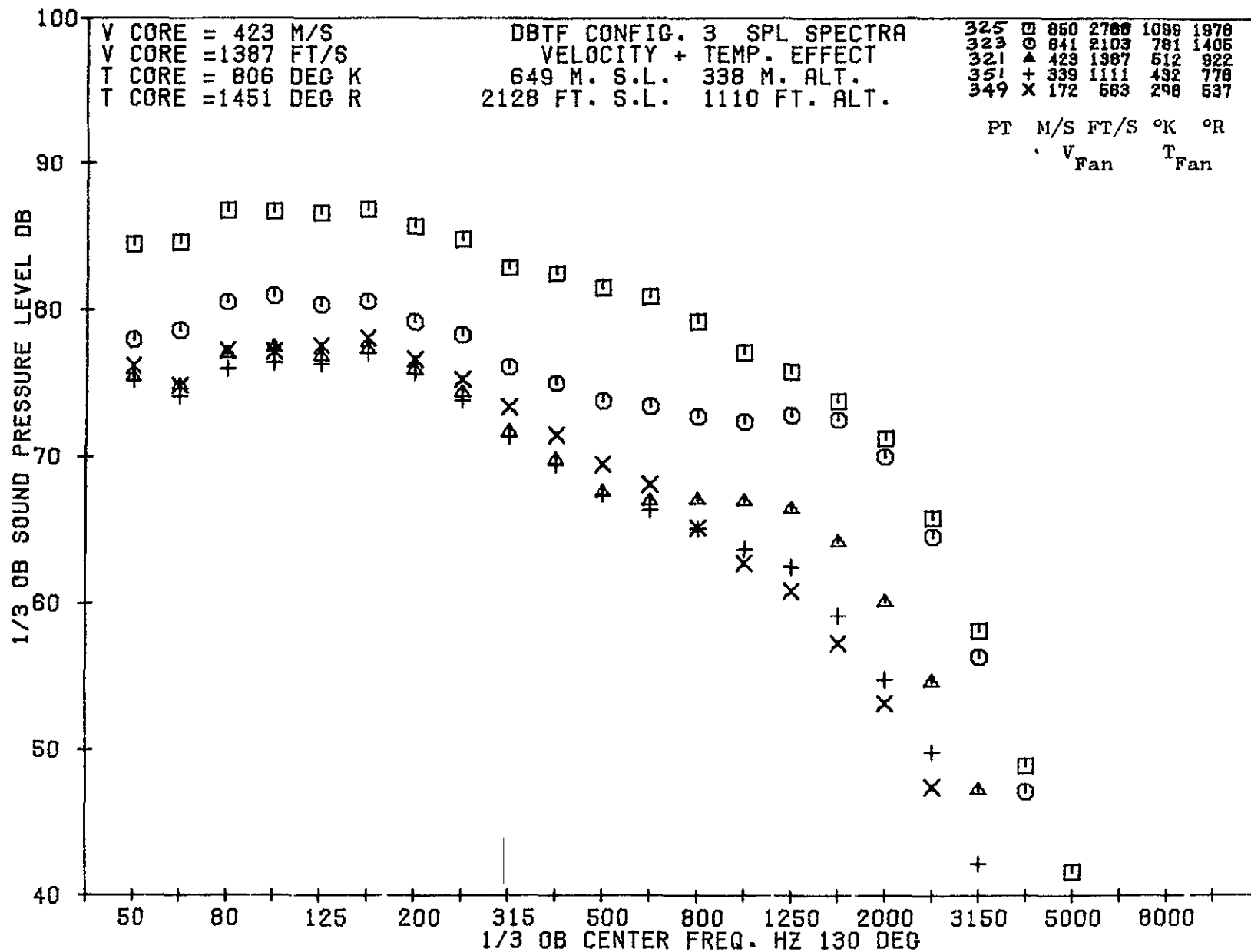
1417

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08/13/75
5R960-001

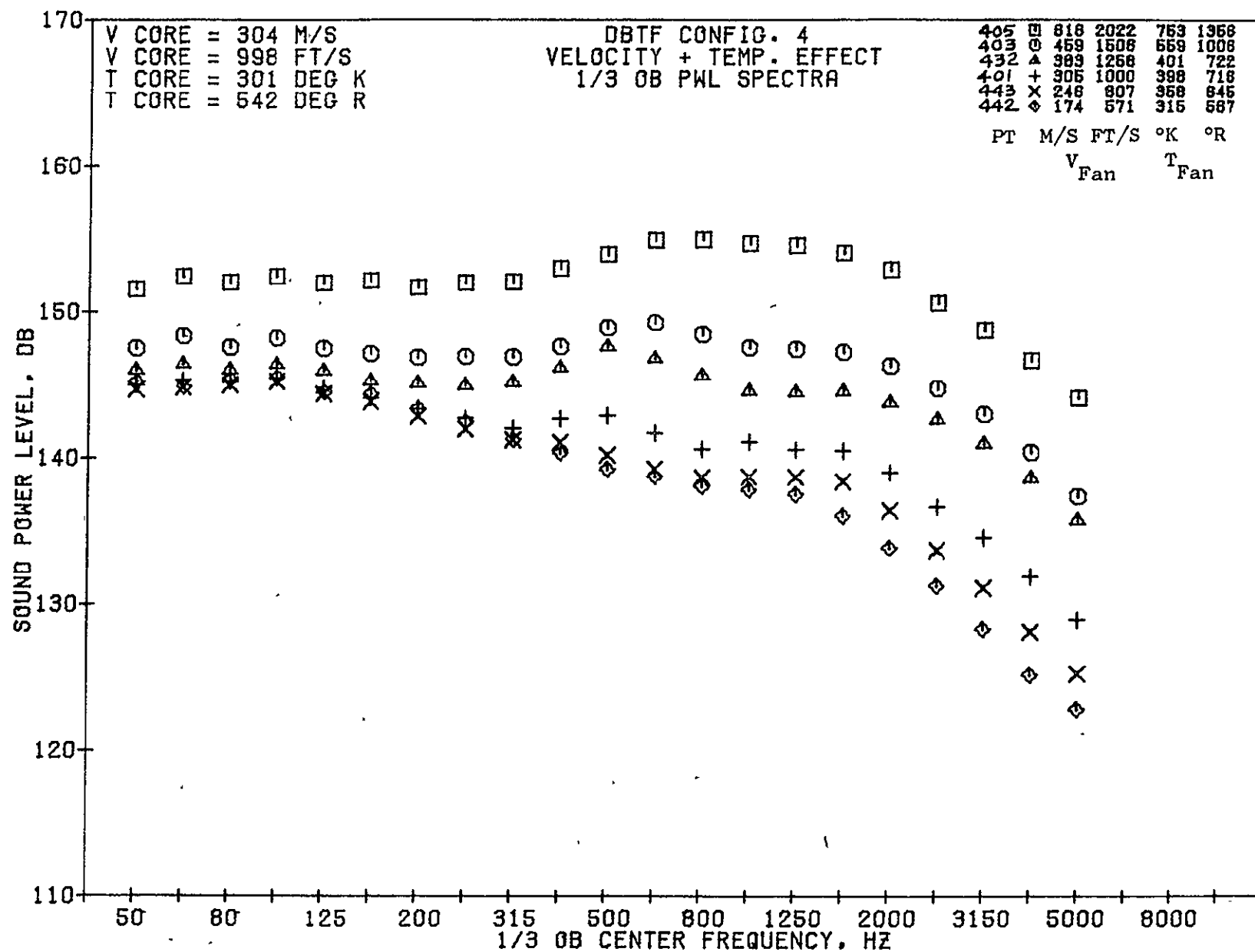
79 BURCH A.

1418



08/13/75
5R960-001

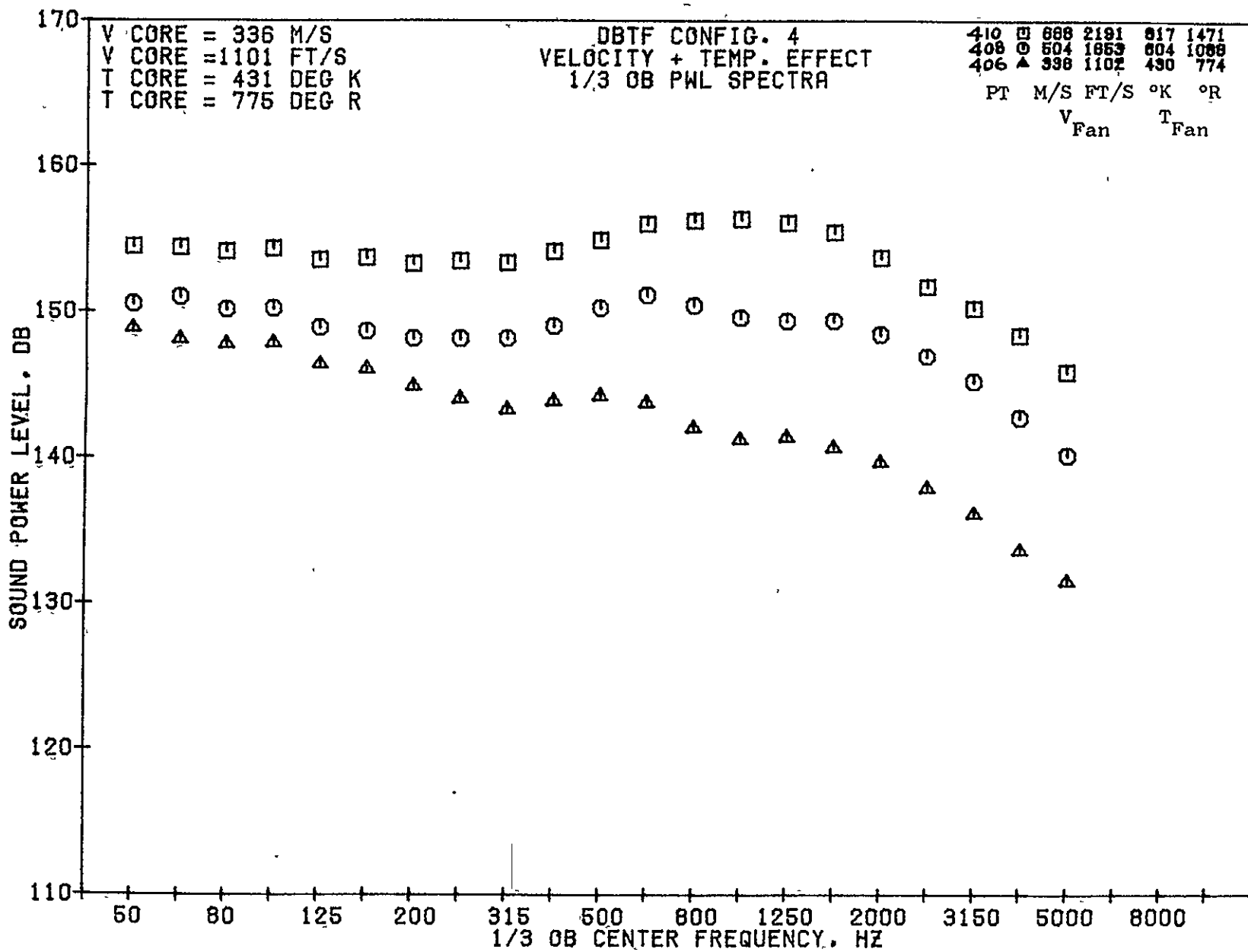
79 BURCH A.



08/13/75
5R959-001

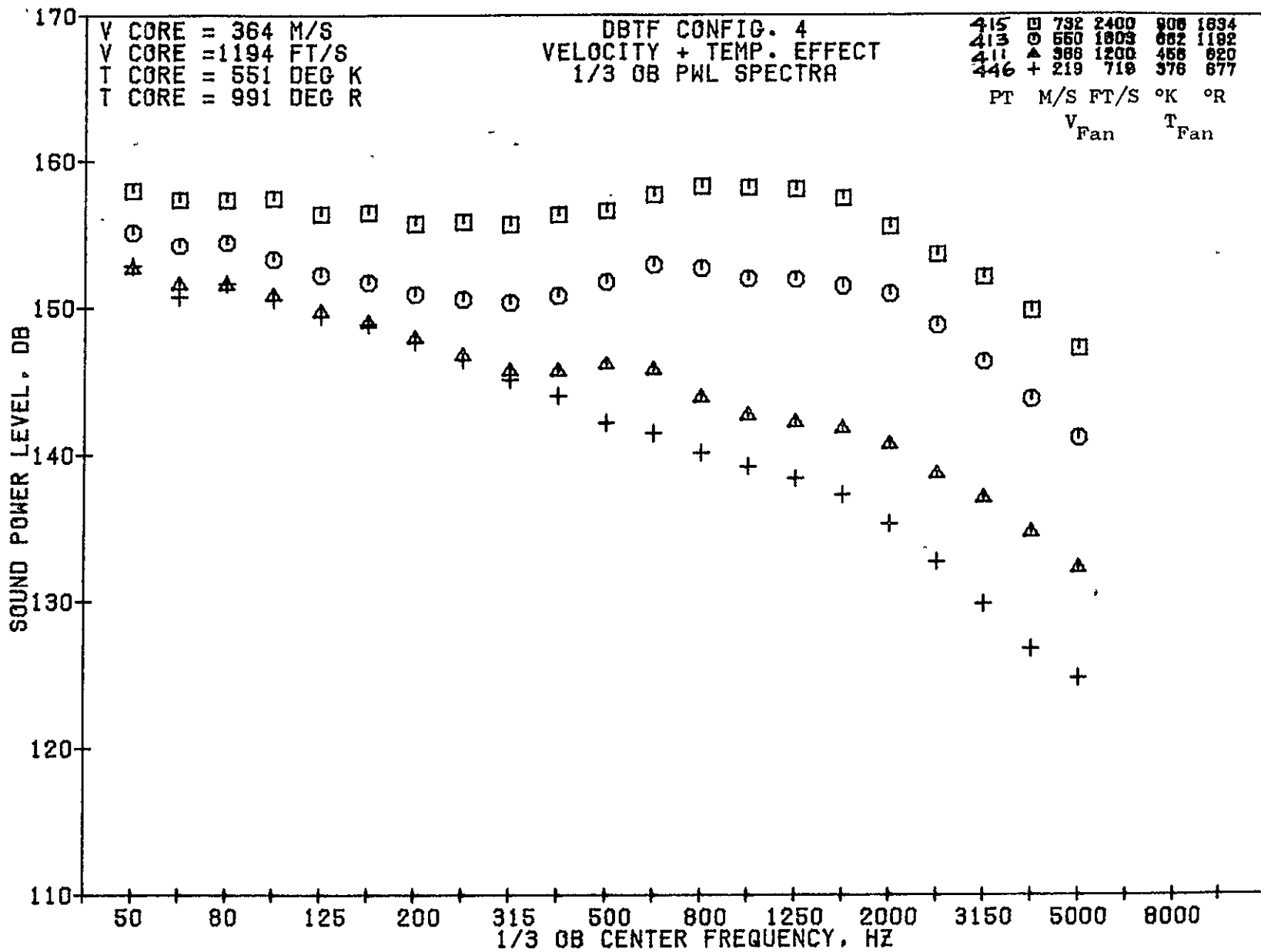
79 BURCH A.

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08/20/75
 5R552-001

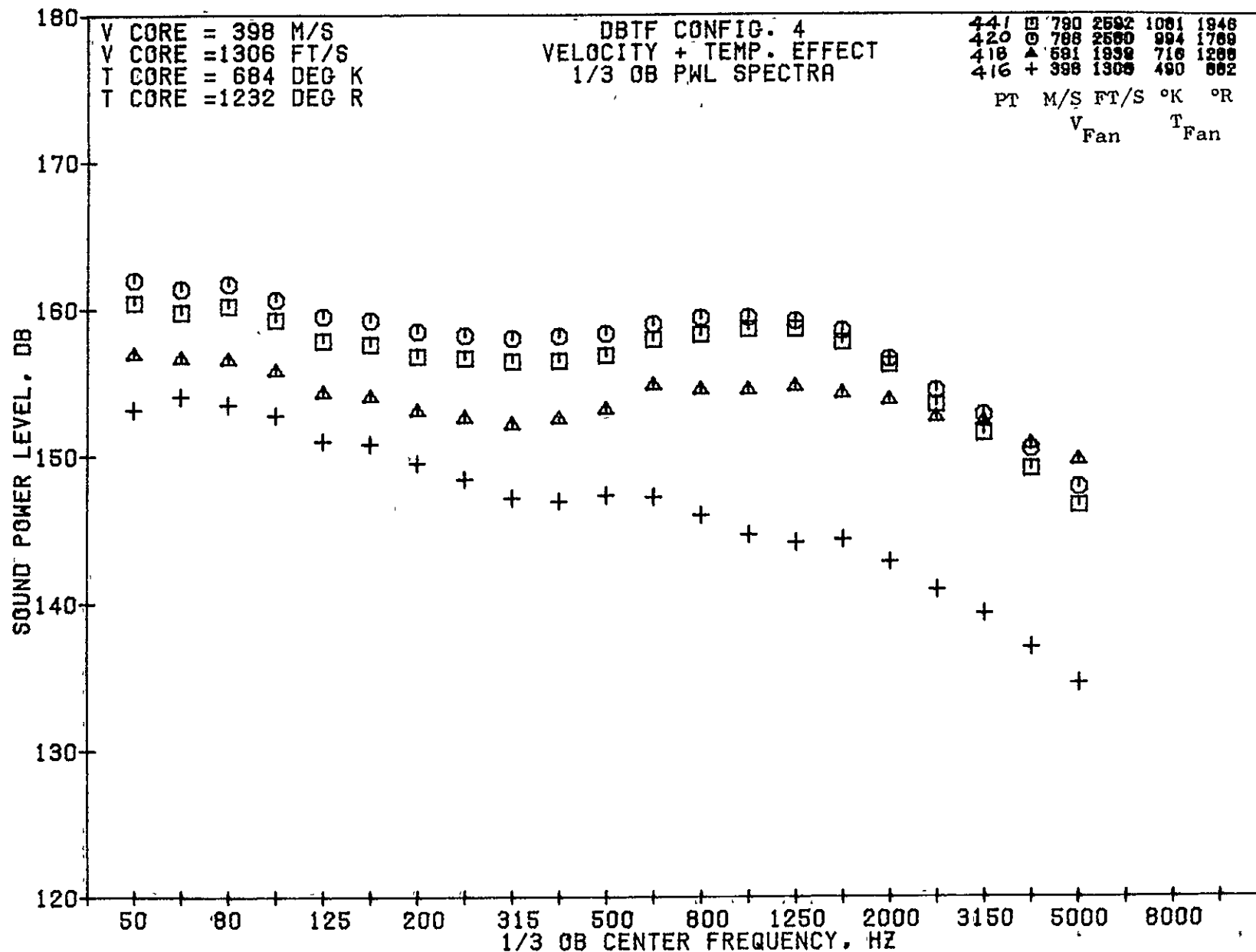
79 BURCH 2.



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08/20/75
5R552-001

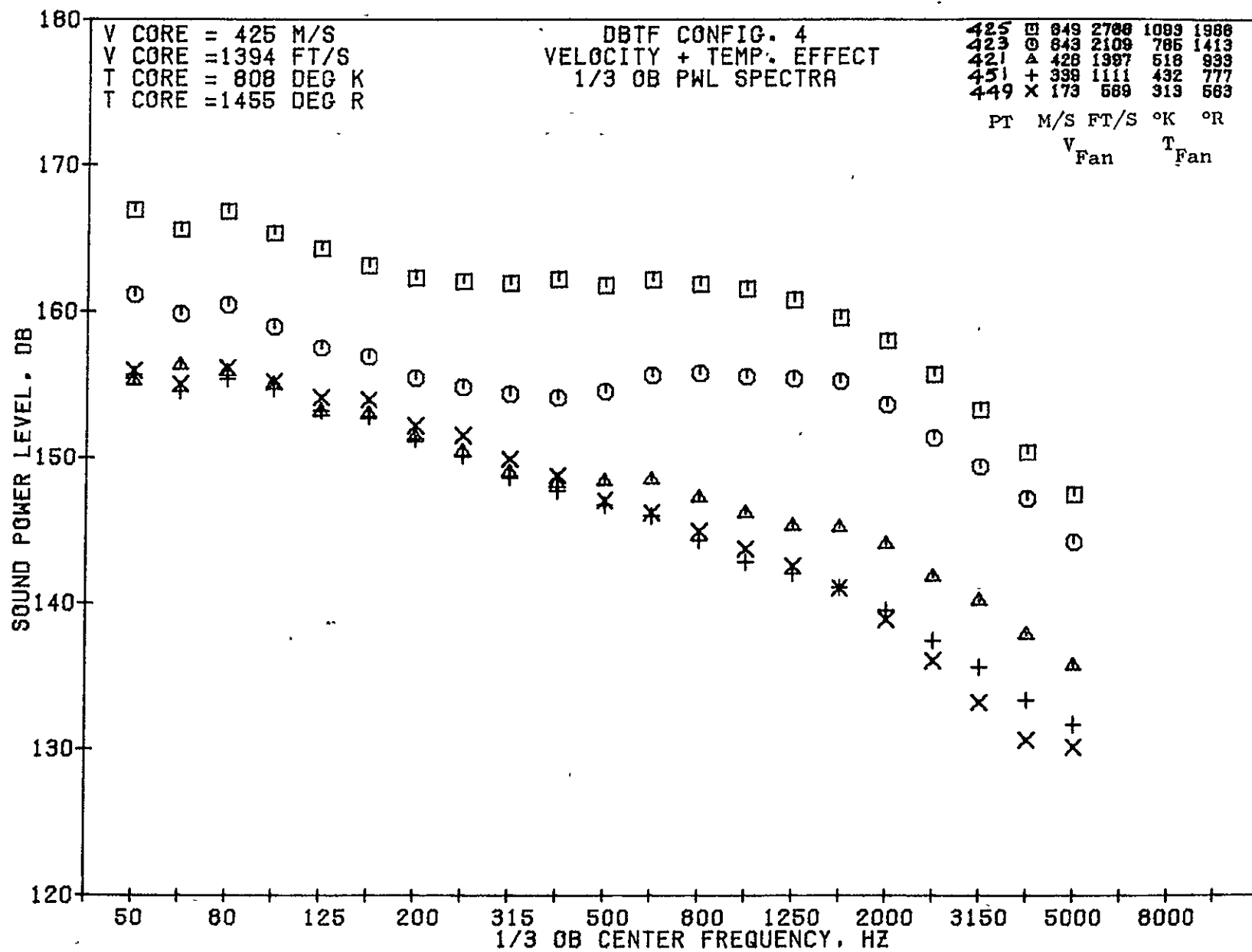
79 BURCH A.



1422

08/20/75
5R552-001

79 BURCH A.

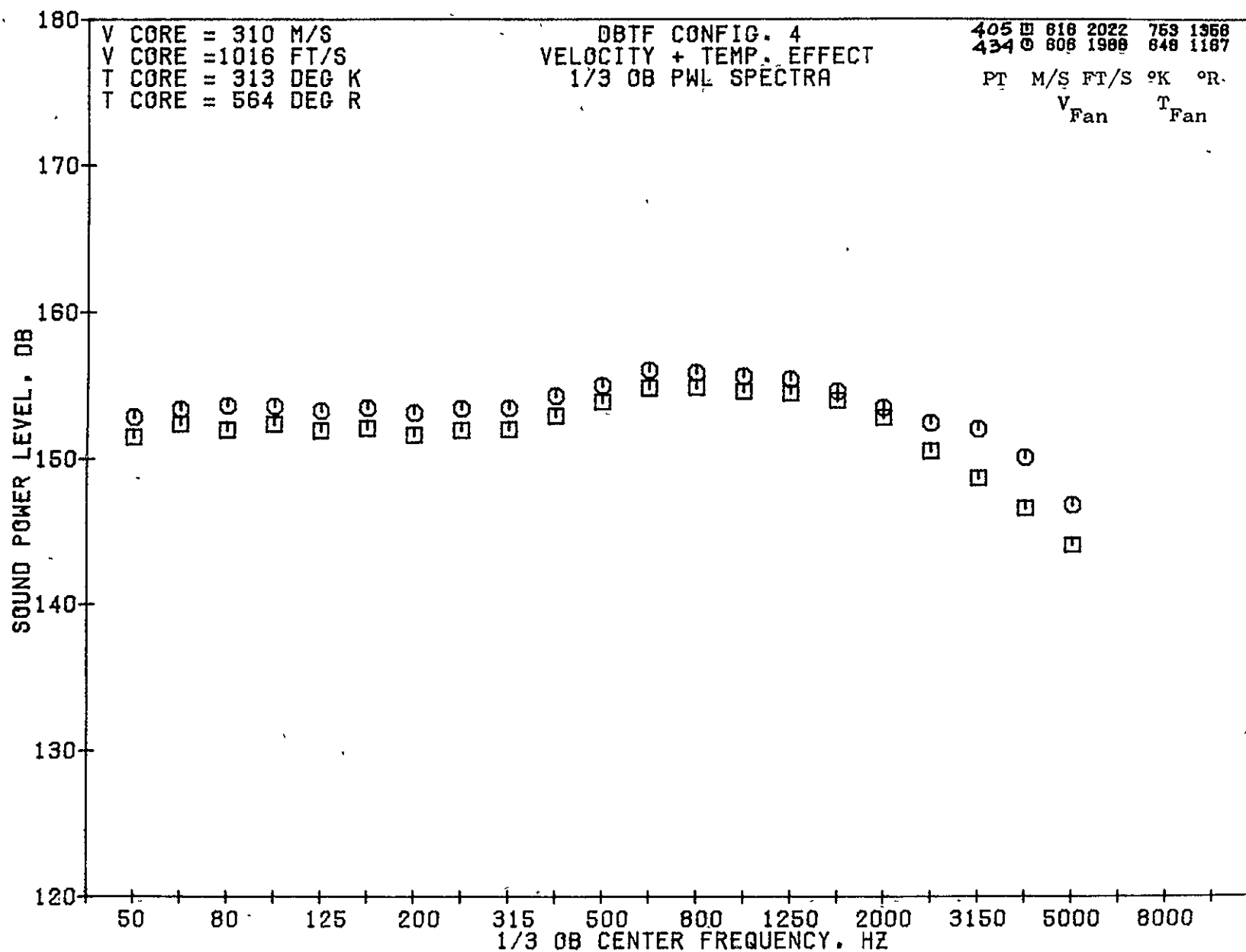


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08/13/75
5R959-001

79 BURCH A.

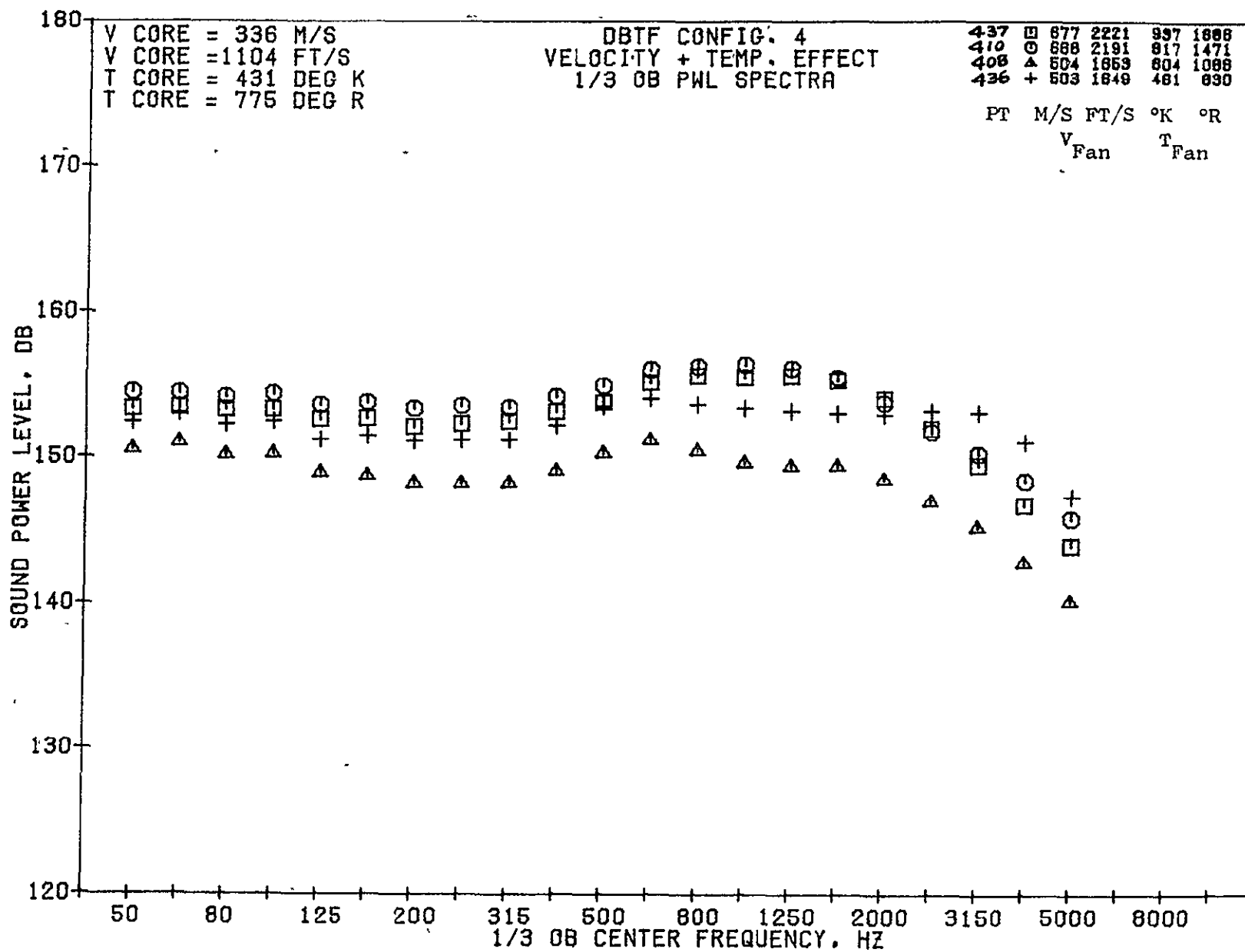
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08/13/75
5R959-001

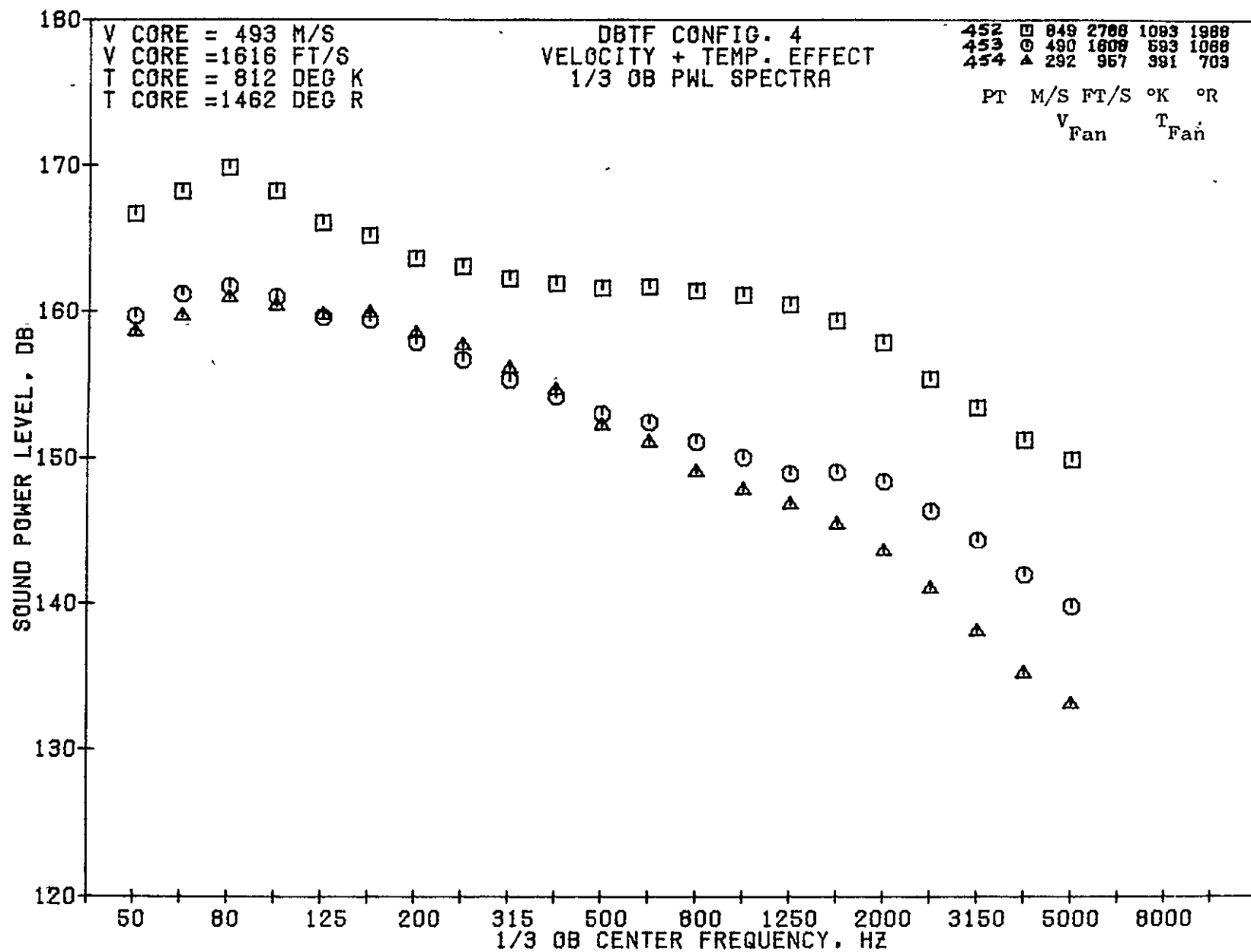
79 BURC

1425


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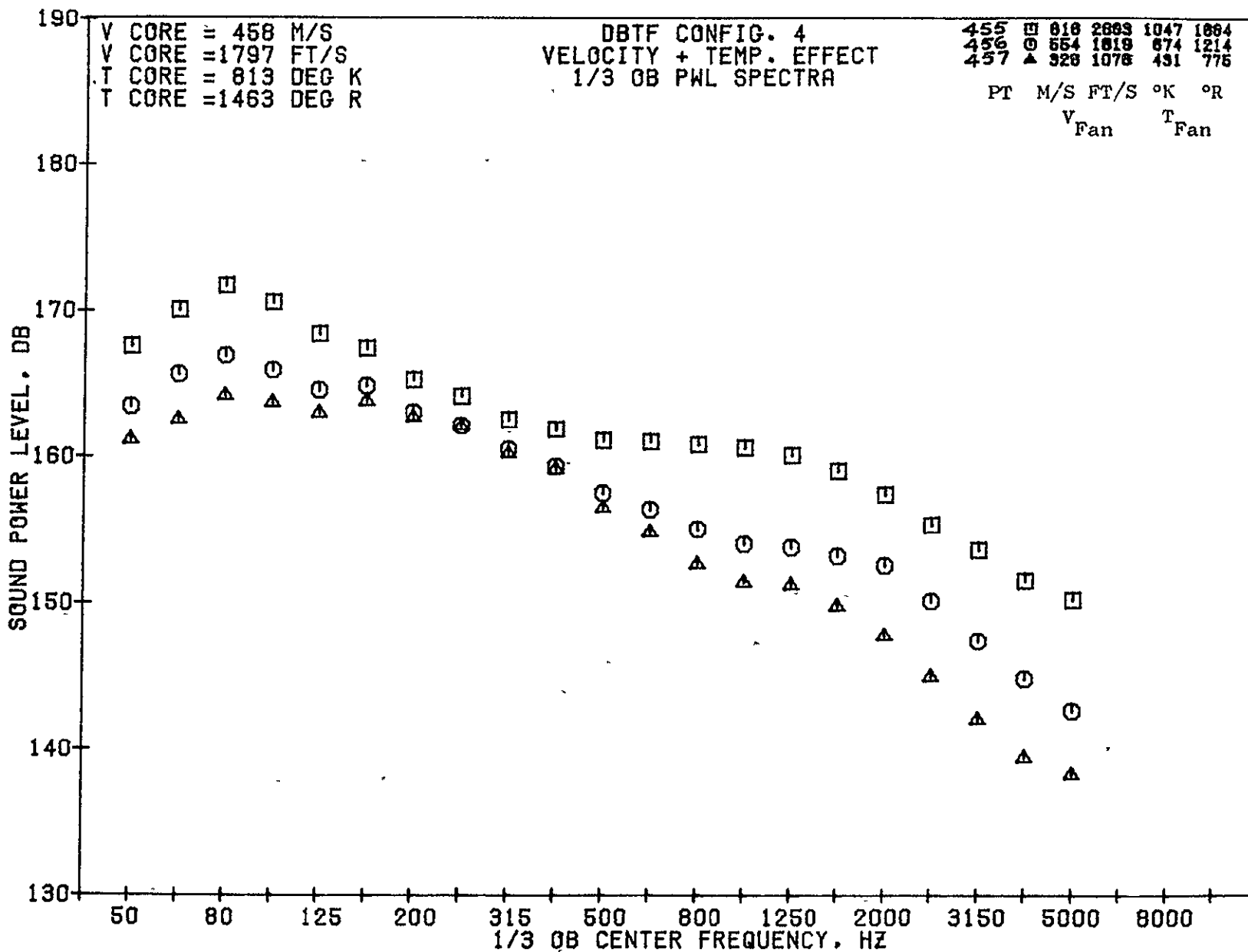
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 5R969-001

79 BURCH A.



08/13/75
5R959-001

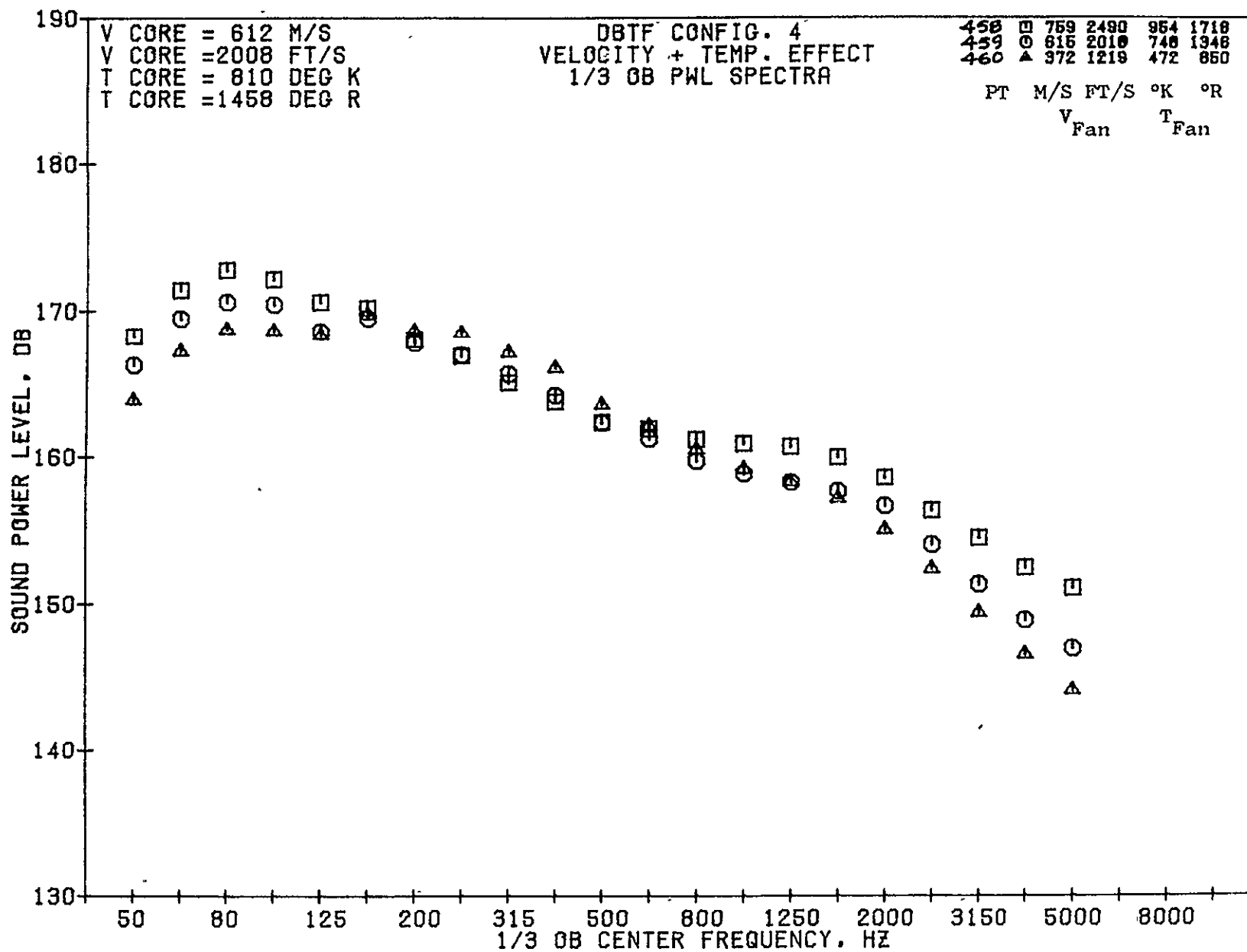
79 BURC A.



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5R552-001

79 BURCH A.



08/13/75
5R959-001

79 BURC

110

V CORE = 304 M/S
 V CORE = 998 FT/S
 T CORE = 301 DEG K
 T CORE = 542 DEG R

DBTF CONFIG. 4 OASPL VS ANGLE
 VELOCITY + TEMP. EFFECT
 649 M. S.L. 338 M. ALT.
 2128 FT. S.L. 1110 FT. ALT.

405	□	818	2022	753	1958
403	○	459	1508	559	1008
432	△	383	1258	401	722
401	+	305	1000	398	718
443	x	248	807	358	645
442	◇	174	571	315	587

PT M/S FT/S °K °R
 V_{Fan} T_{Fan}

OASPL, DB
 100
 90
 80
 70
 60
 50

20 40 60 80 100 120 140 160 180
 ANGLE TO INLET

OASPL, DB

1429

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08/13/75
 5R959-001

79 BURCH A.

4-1941

110

V CORE = 336 M/S
 V CORE = 1101 FT/S
 T CORE = 431 DEG K
 T CORE = 775 DEG R

DBTF CONFIG. 4 OASPL VS ANGLE
 VELOCITY + TEMP. EFFECT
 649 M. S.L. 338 M. ALT.
 2128 FT. S.L. 1110 FT. ALT.

410 888 2191 817 1471
 408 504 1853 804 1088
 406 336 1102 430 774

PT M/S FT/S °K °R
 V_{Fan} T_{Fan}

100

90

80

70

60

50

OASPL, DB

20

40

60

80

100

120

140

160

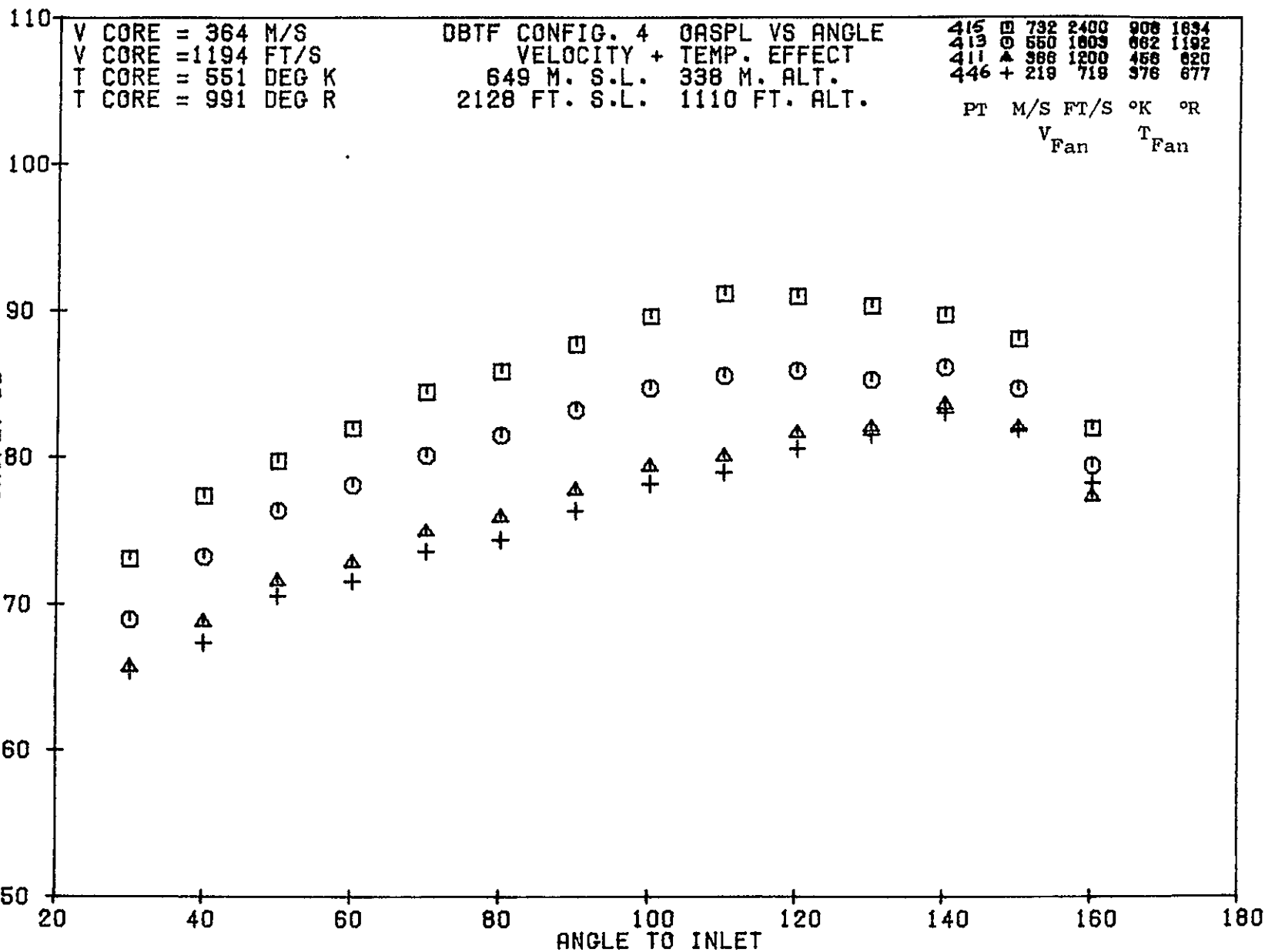
180

ANGLE TO INLET

1430

08/20/75
 5R552-001

79 BURCH



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110

V CORE = 398 M/S
 V CORE = 1306 FT/S
 T CORE = 684 DEG K
 T CORE = 1232 DEG R

DBTF CONFIG. 4 GASPL VS ANGLE
 VELOCITY + TEMP. EFFECT
 649 M. S.L. 338 M. ALT.
 2128 FT. S.L. 1110 FT. ALT.

441	790	2592	1081	1948
420	788	2580	994	1788
418	591	1838	718	1288
416	388	1308	490	882

PT	M/S	FT/S	°K	°R
	V _{Fan}		T _{Fan}	

100

90

80

70

60

50

GASPL, DB

20

40

60

80

100

120

140

160

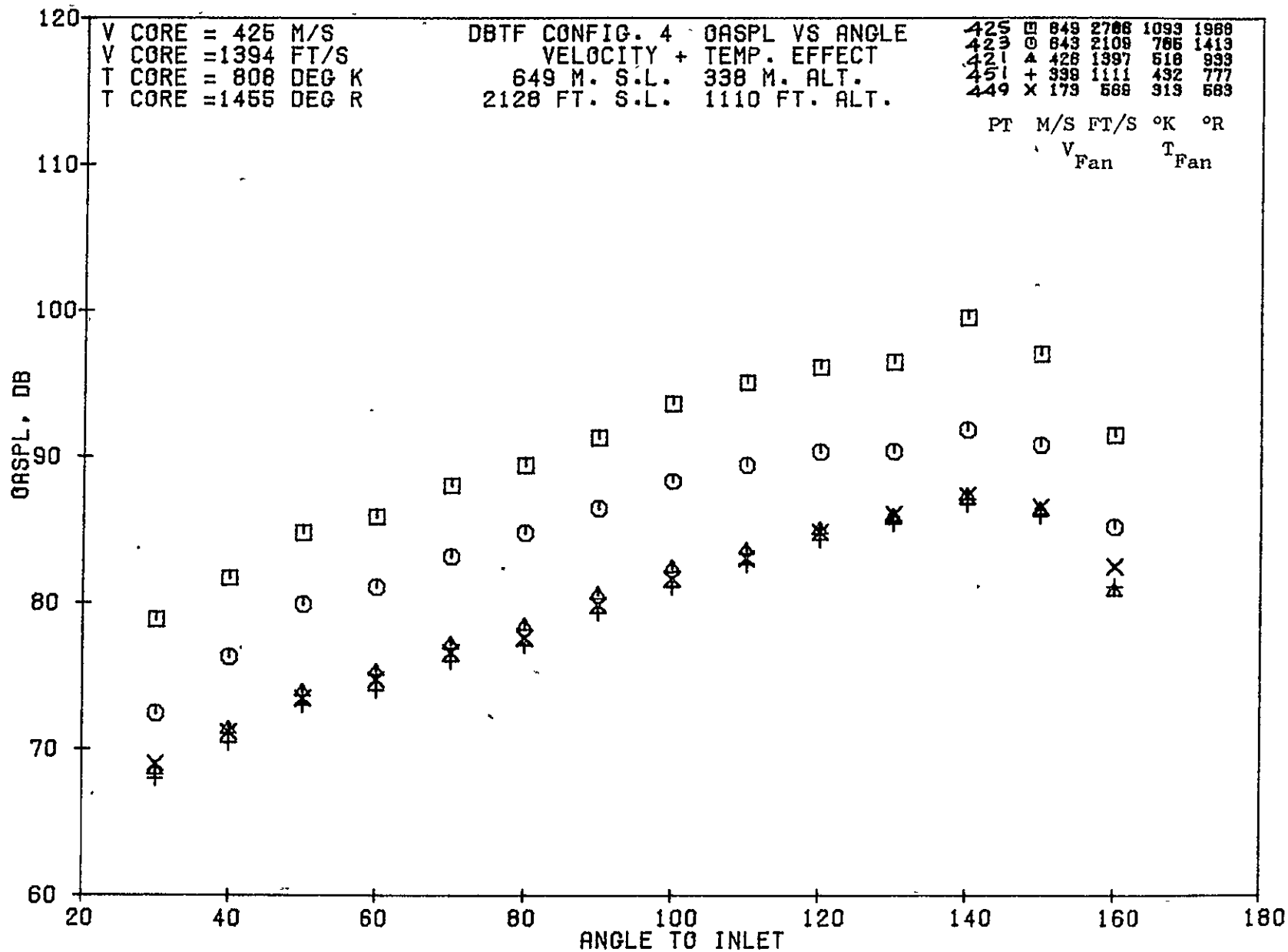
180

ANGLE TO INLET

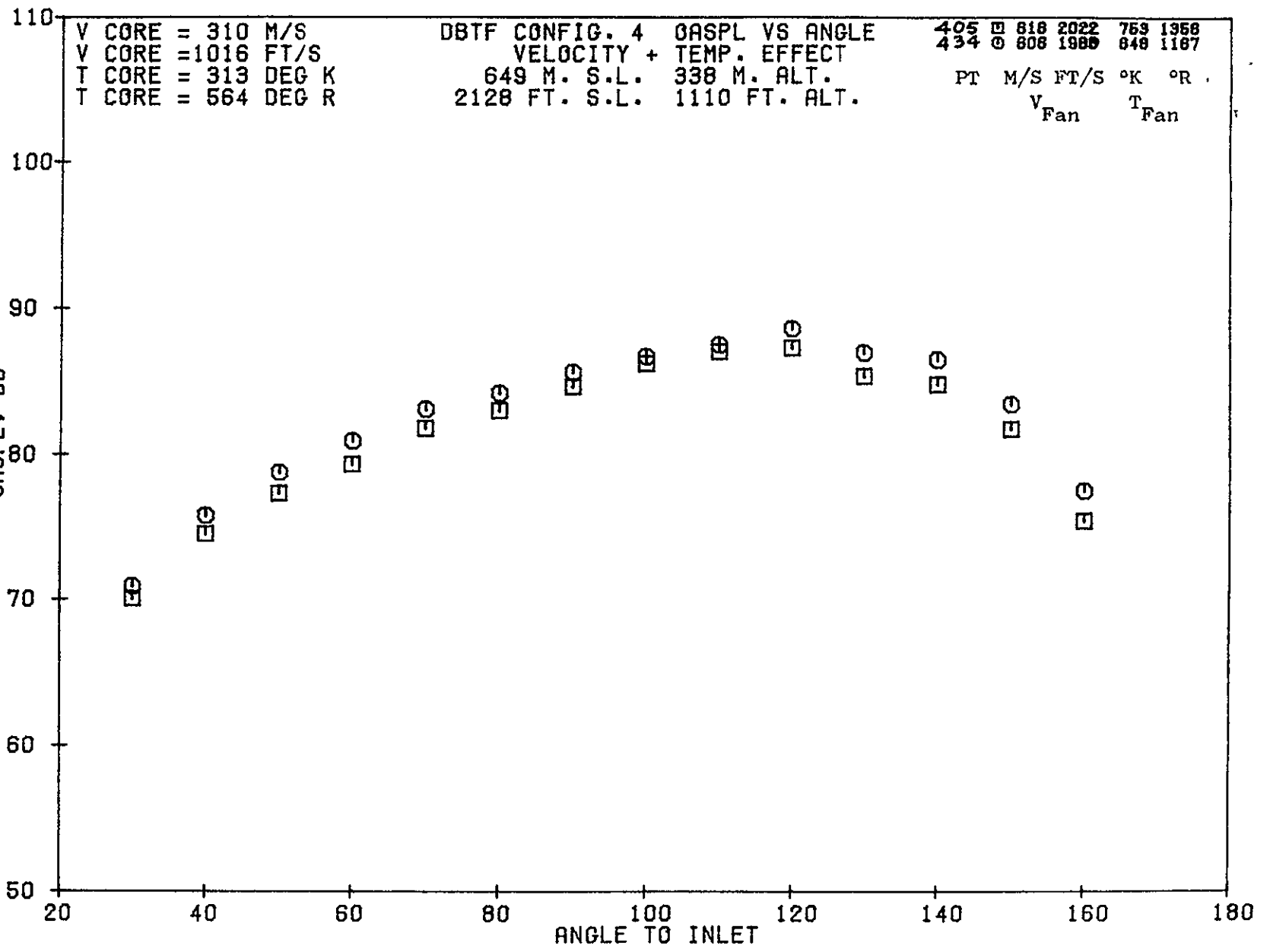
1432

08/20/75
 5R552-001

79 BURCH



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1434

11-199

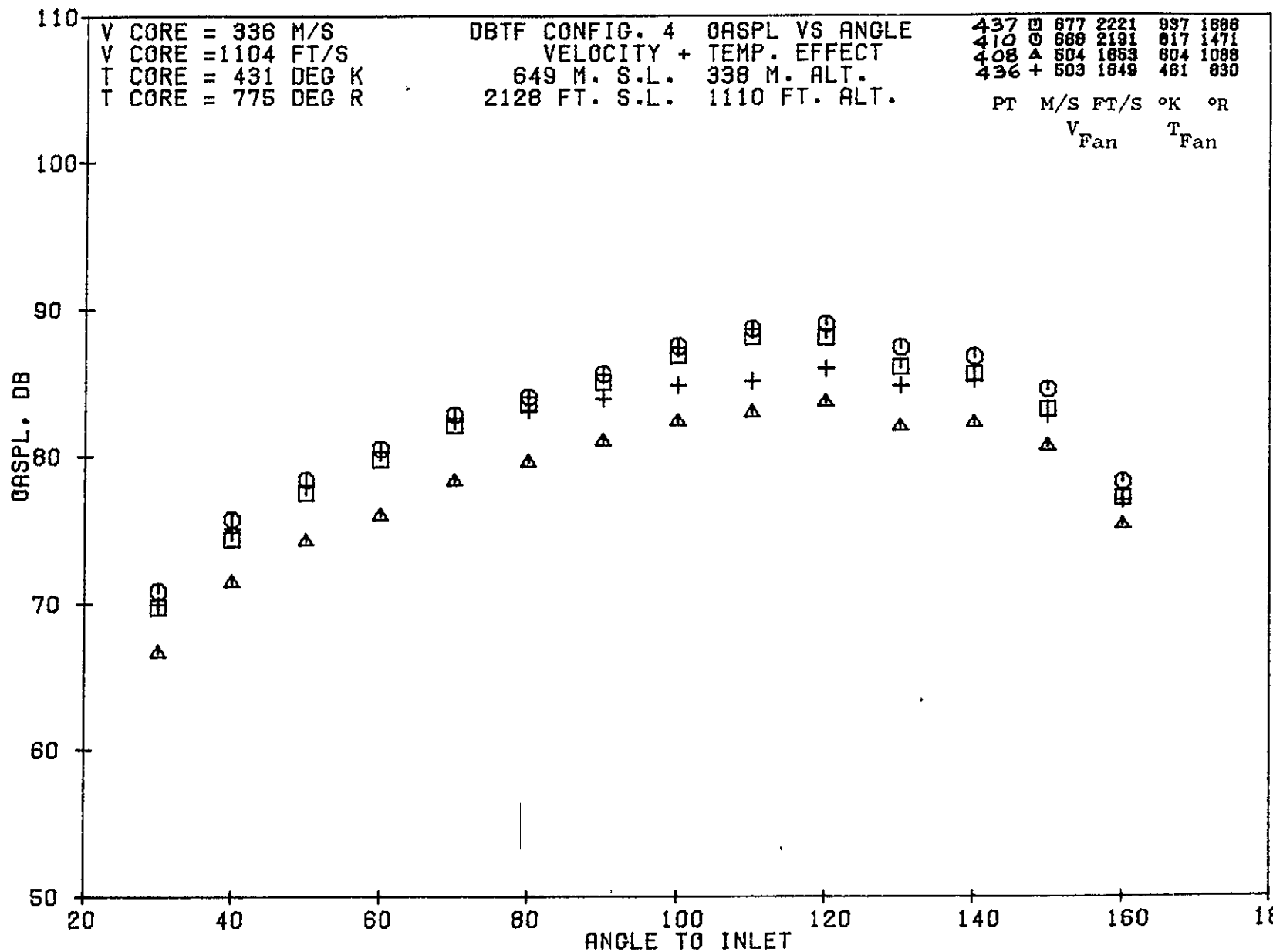
08/13/75
5R959-001

79 BURC 11.

V CORE = 336 M/S DBTF CONFIG. 4 GASPL VS ANGLE
V CORE = 1104 FT/S VELOCITY + TEMP. EFFECT
T CORE = 431 DEG K 649 M. S.L. 338 M. ALT.
T CORE = 775 DEG R 2128 FT. S.L. 1110 FT. ALT.

437	877	2221	937	1888
410	888	2191	817	1471
408	504	1853	804	1088
436	503	1848	481	830

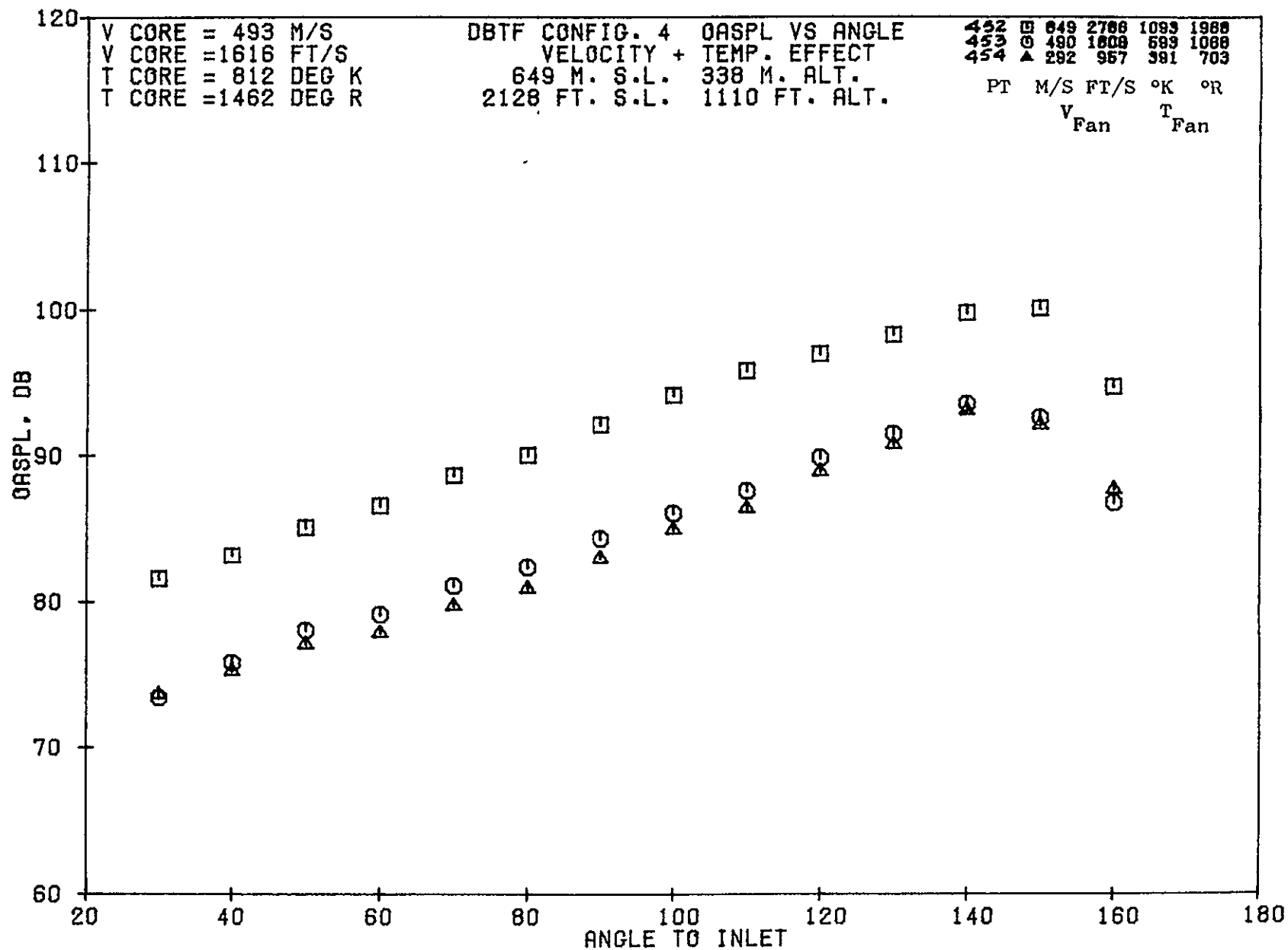
PT	M/S	FT/S	°K	°R
	V _{Fan}		T _{Fan}	



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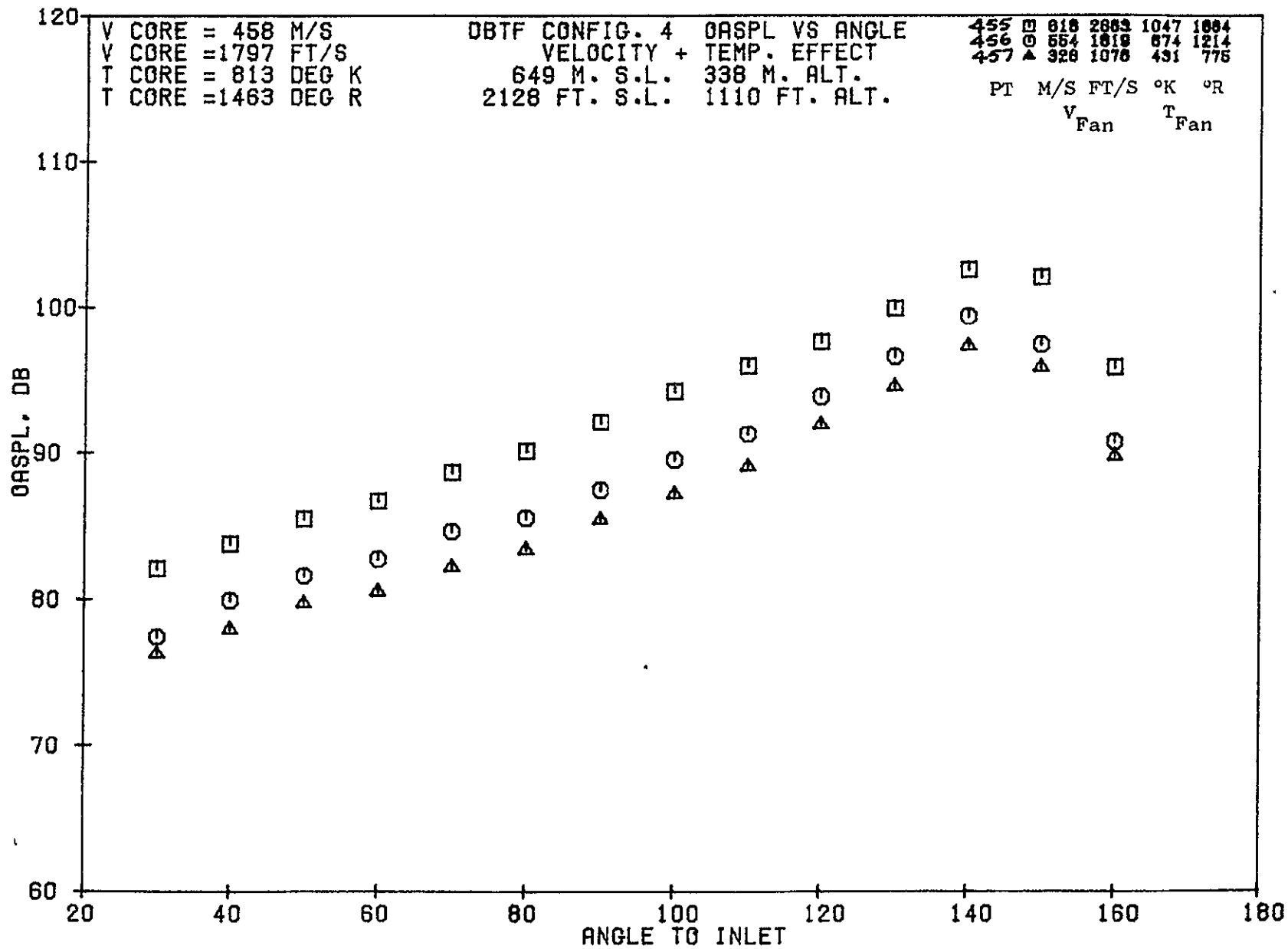
08/13/75
5R959-001

79 BURCH A.



08/13/75
5R959-001.

79 BURC A.

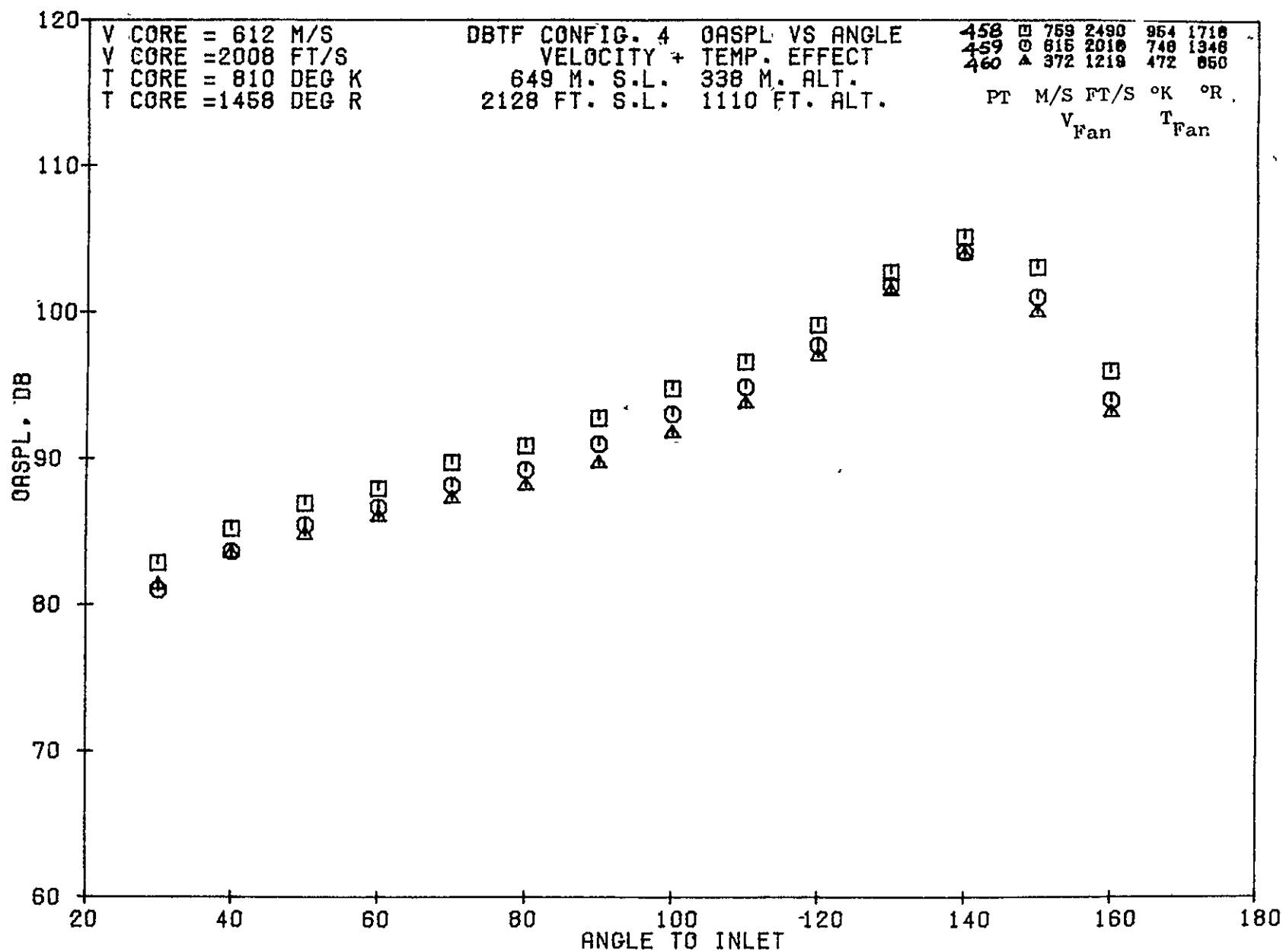


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08/20/75
5R552-001

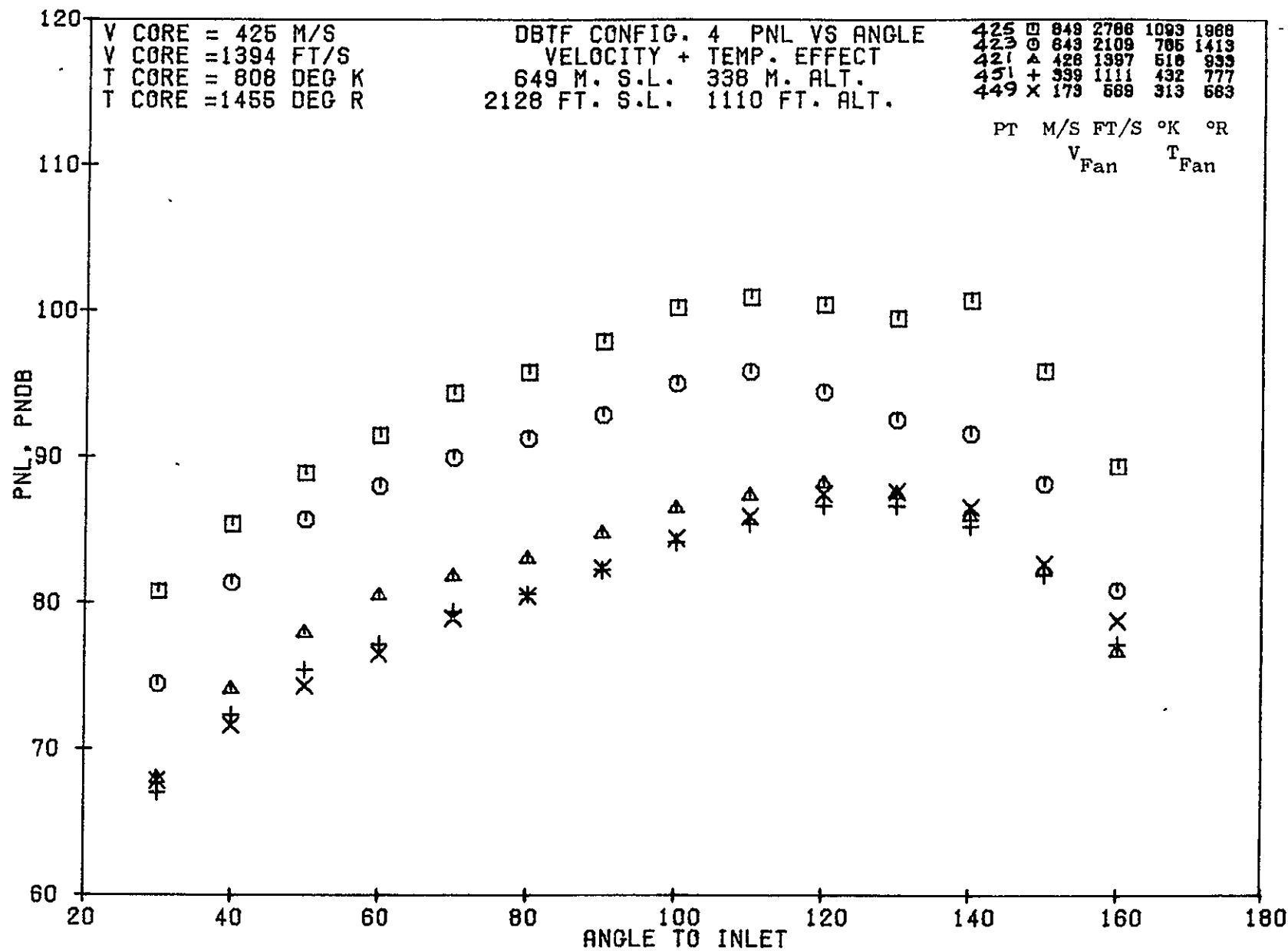
79 BURCH A.

4-20-75



08/13/75
5R959-001

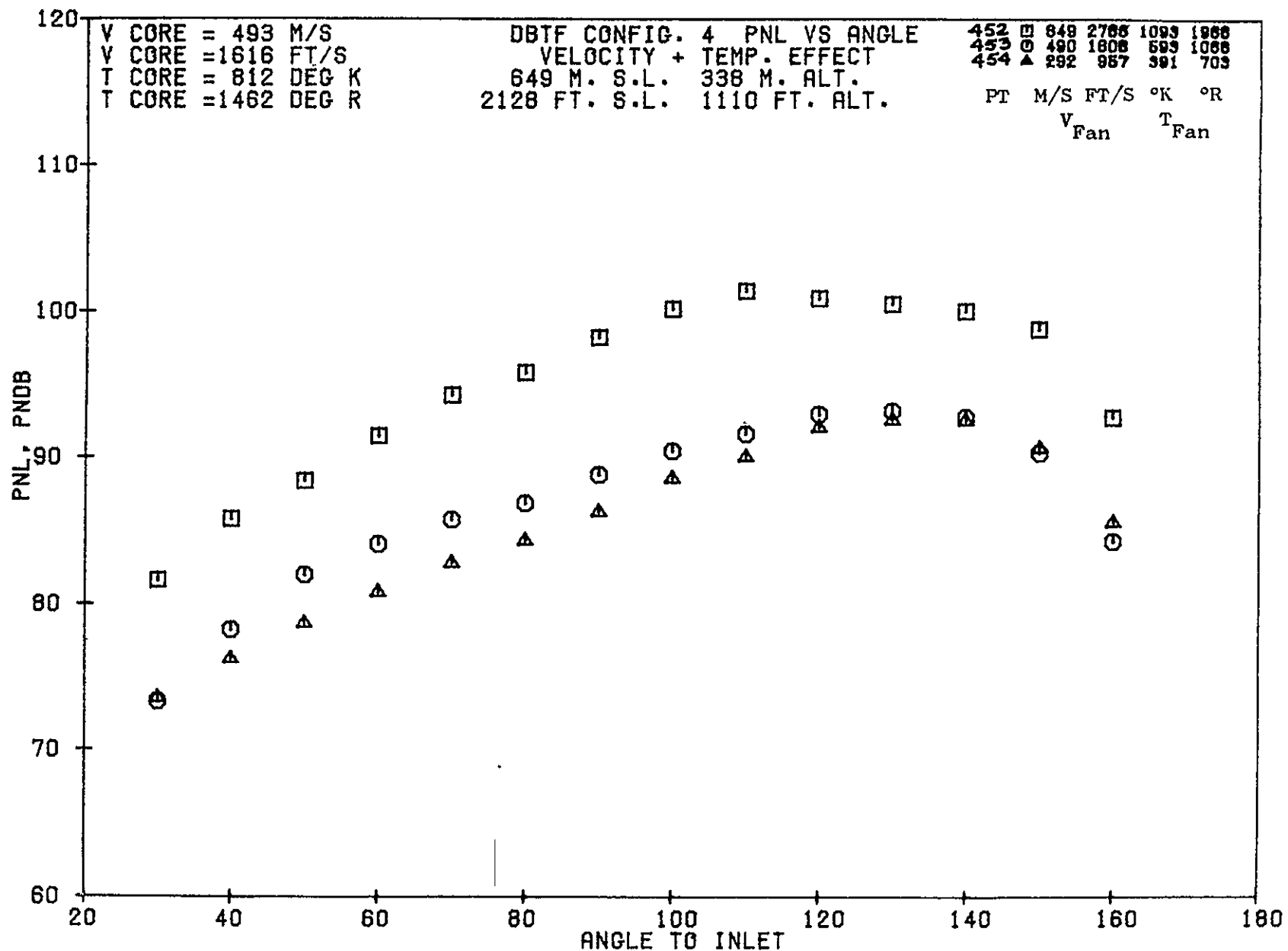
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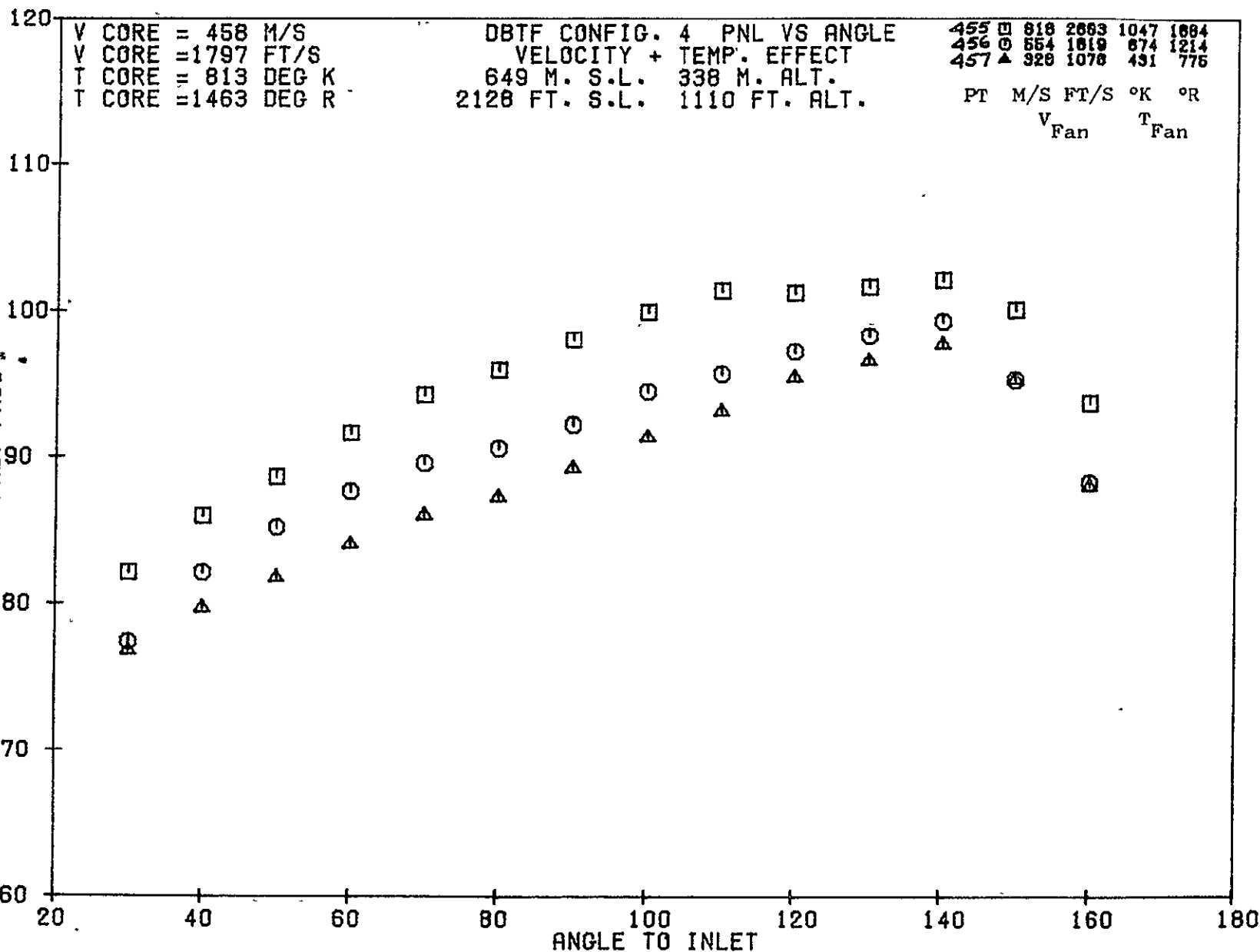
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5R552-001

79 BURCH A.



08/20/75
5R552-001

79 BURCH A.

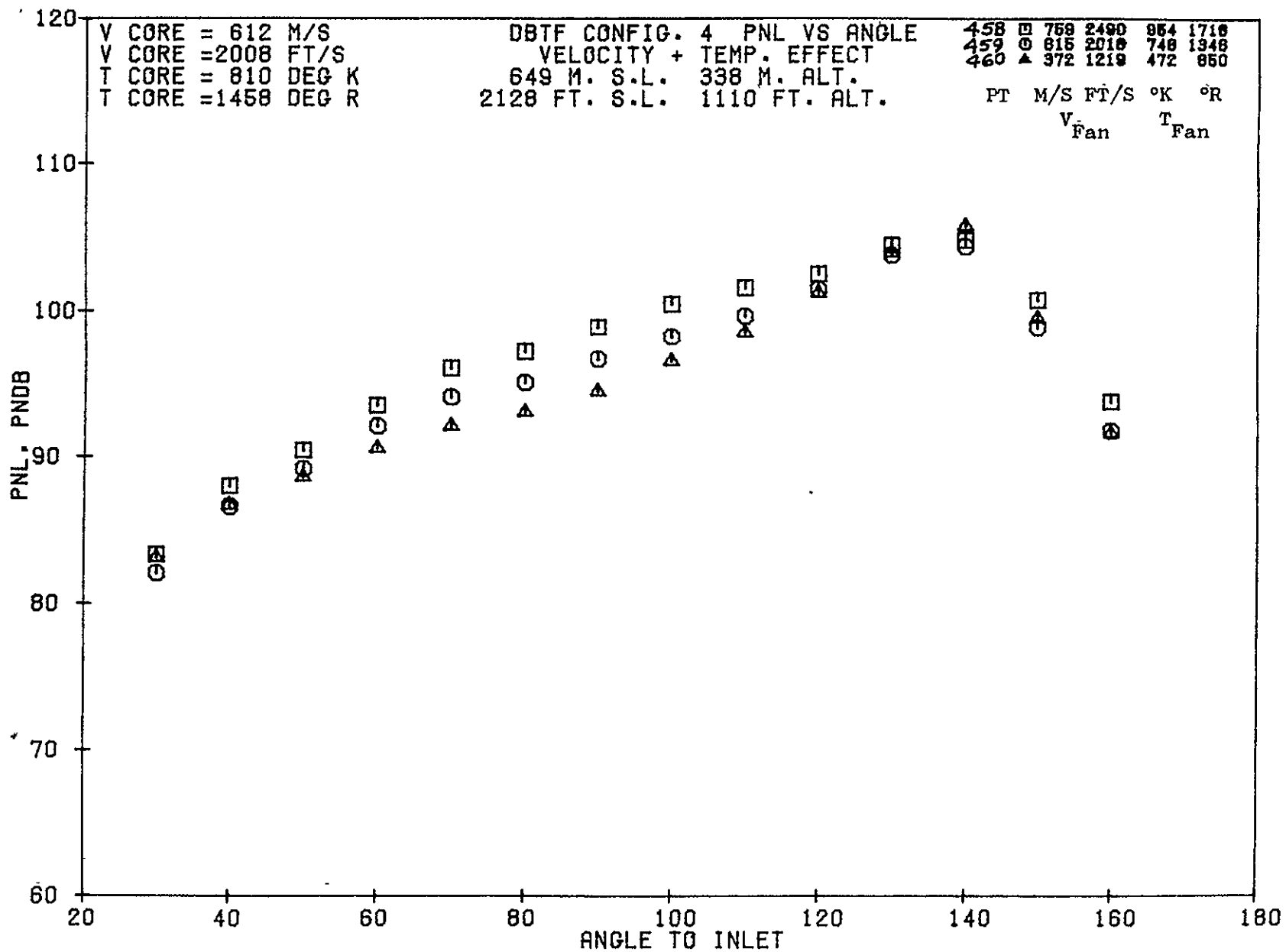


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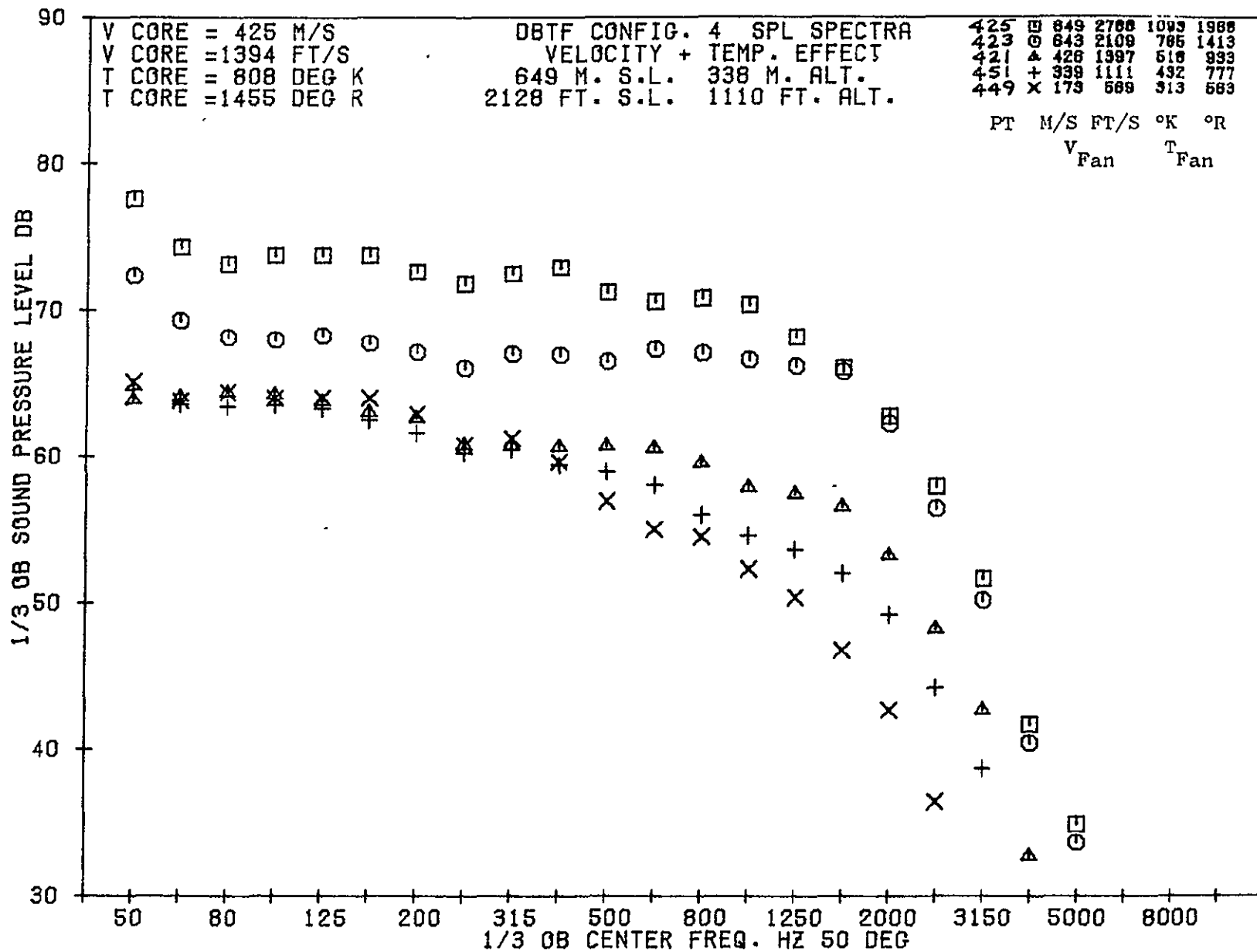
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5R959-001

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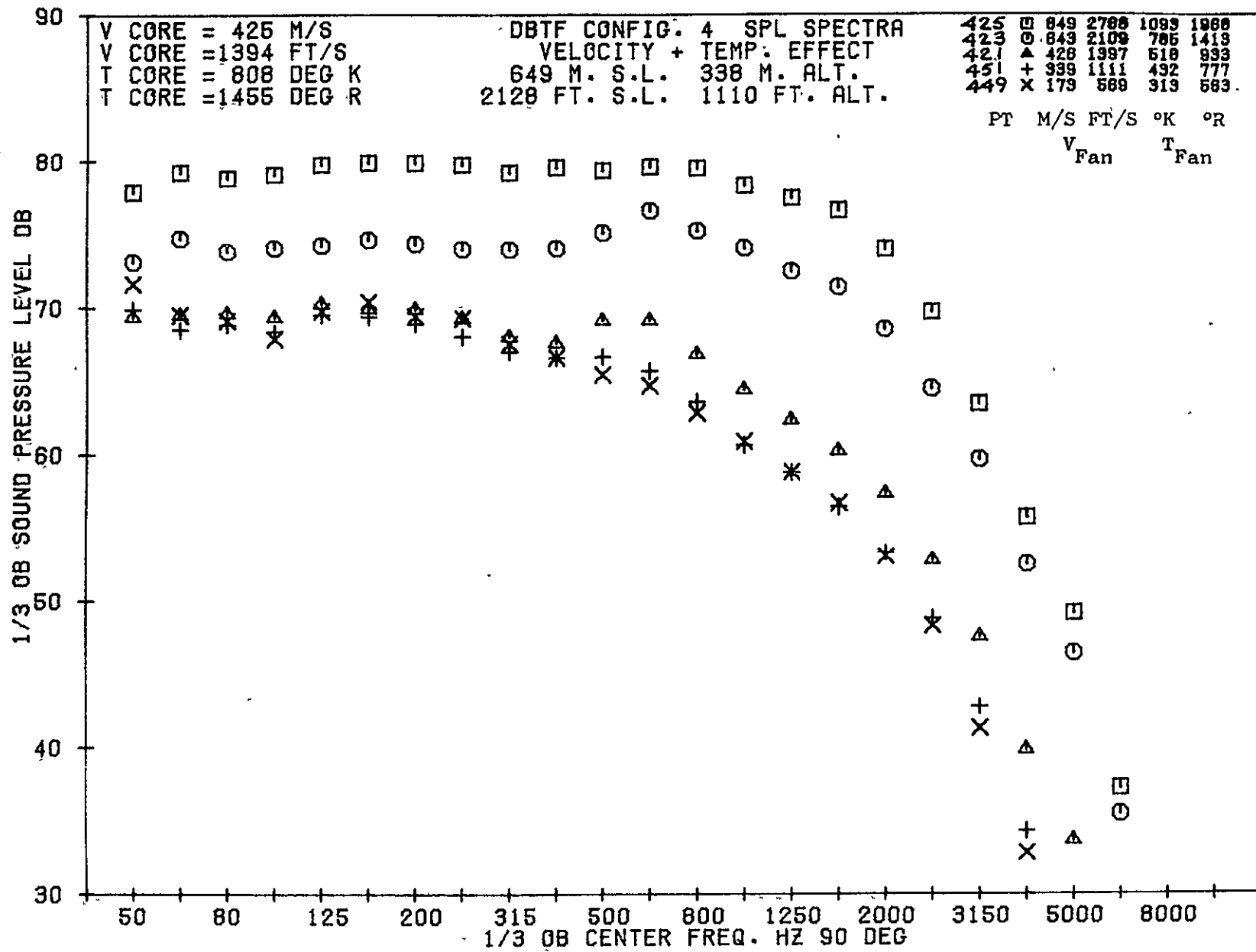


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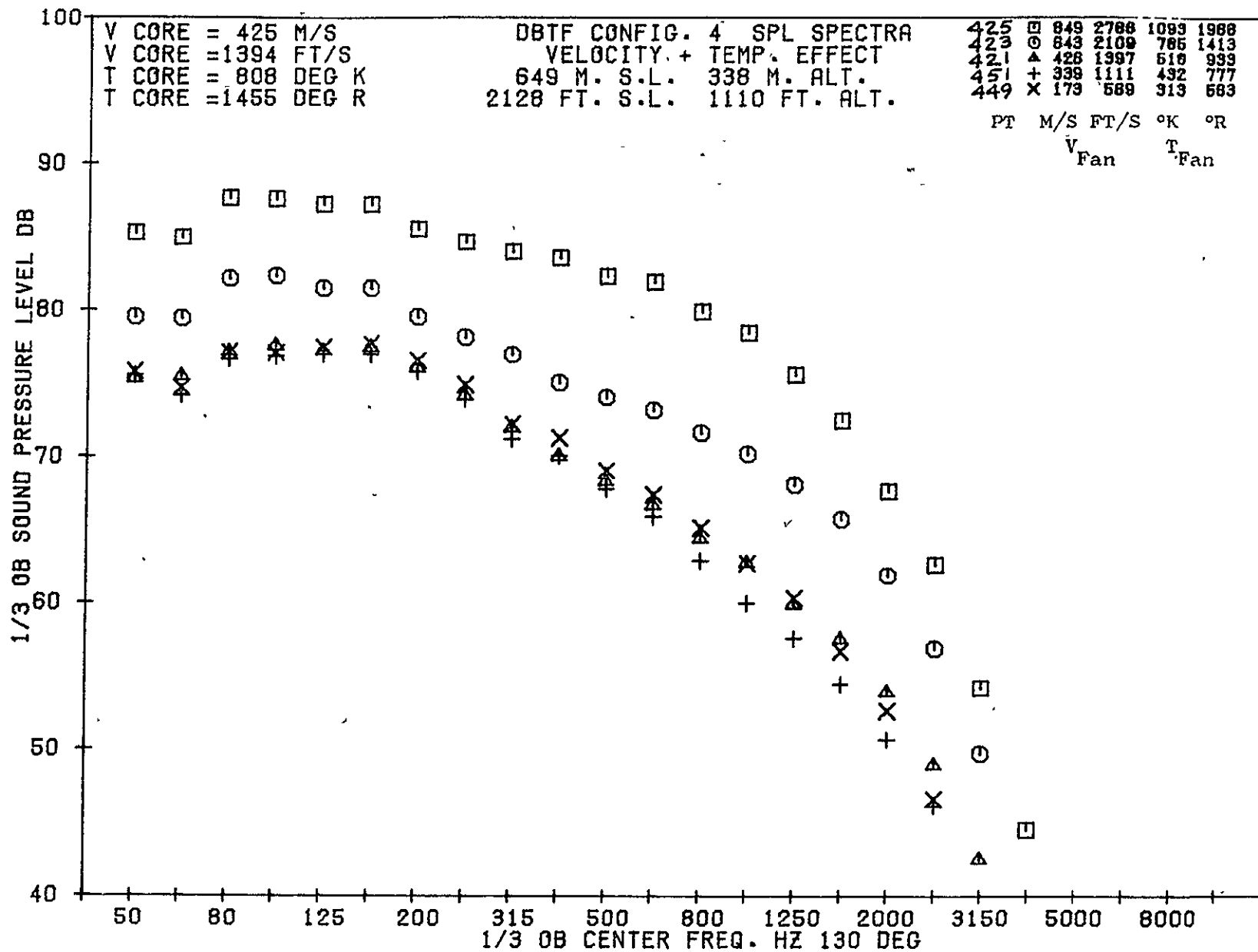
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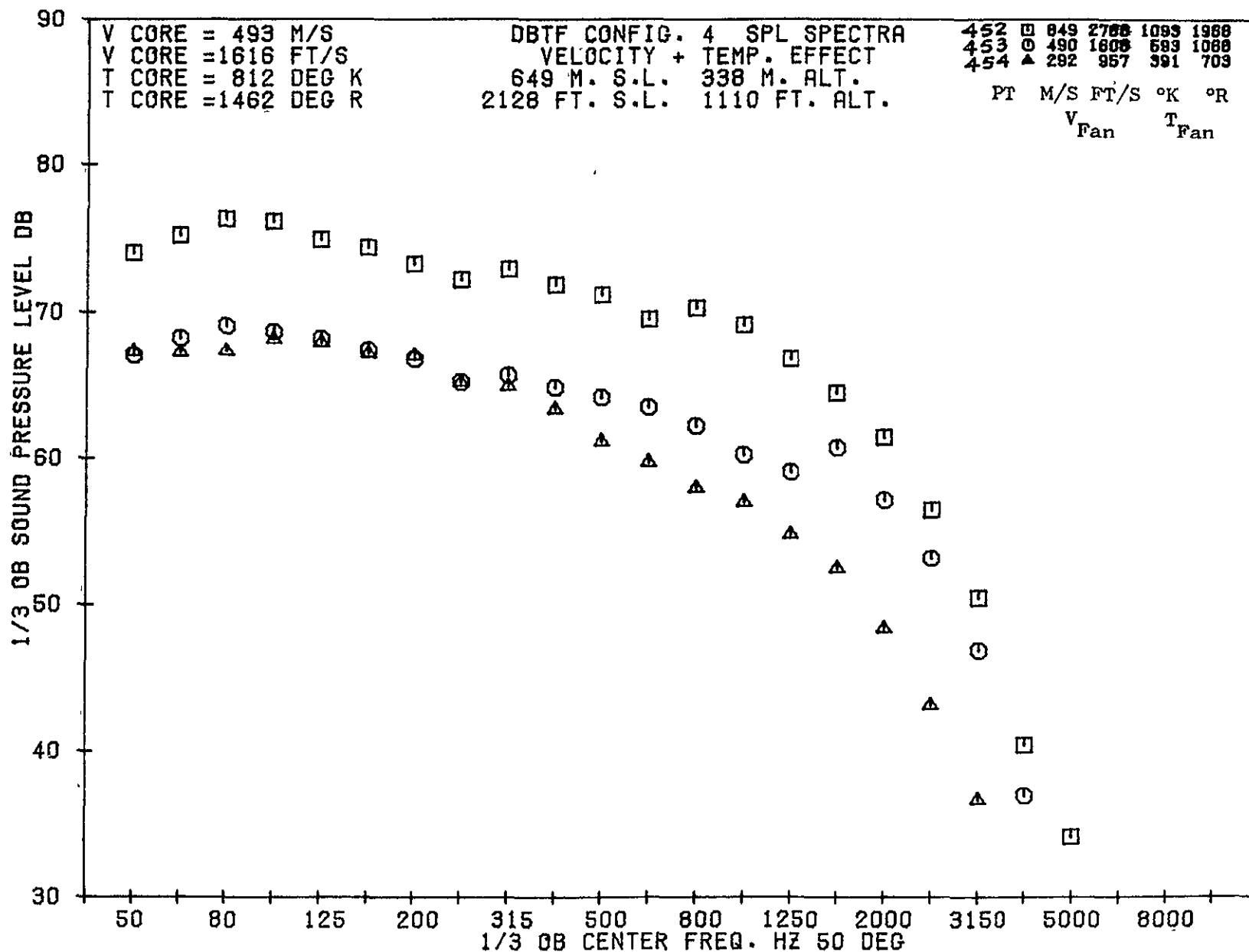


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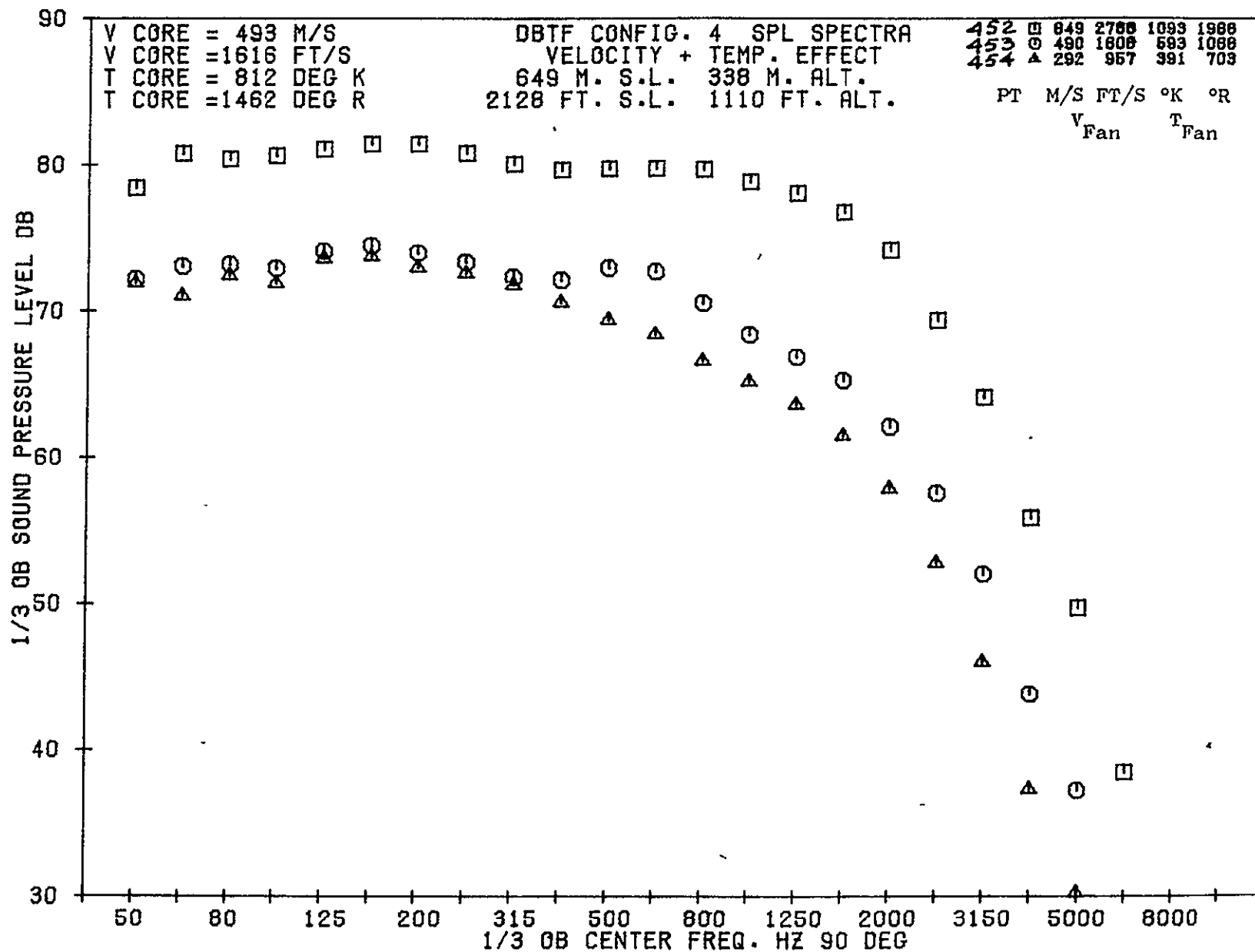
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5R959-001

79 BURCH A.

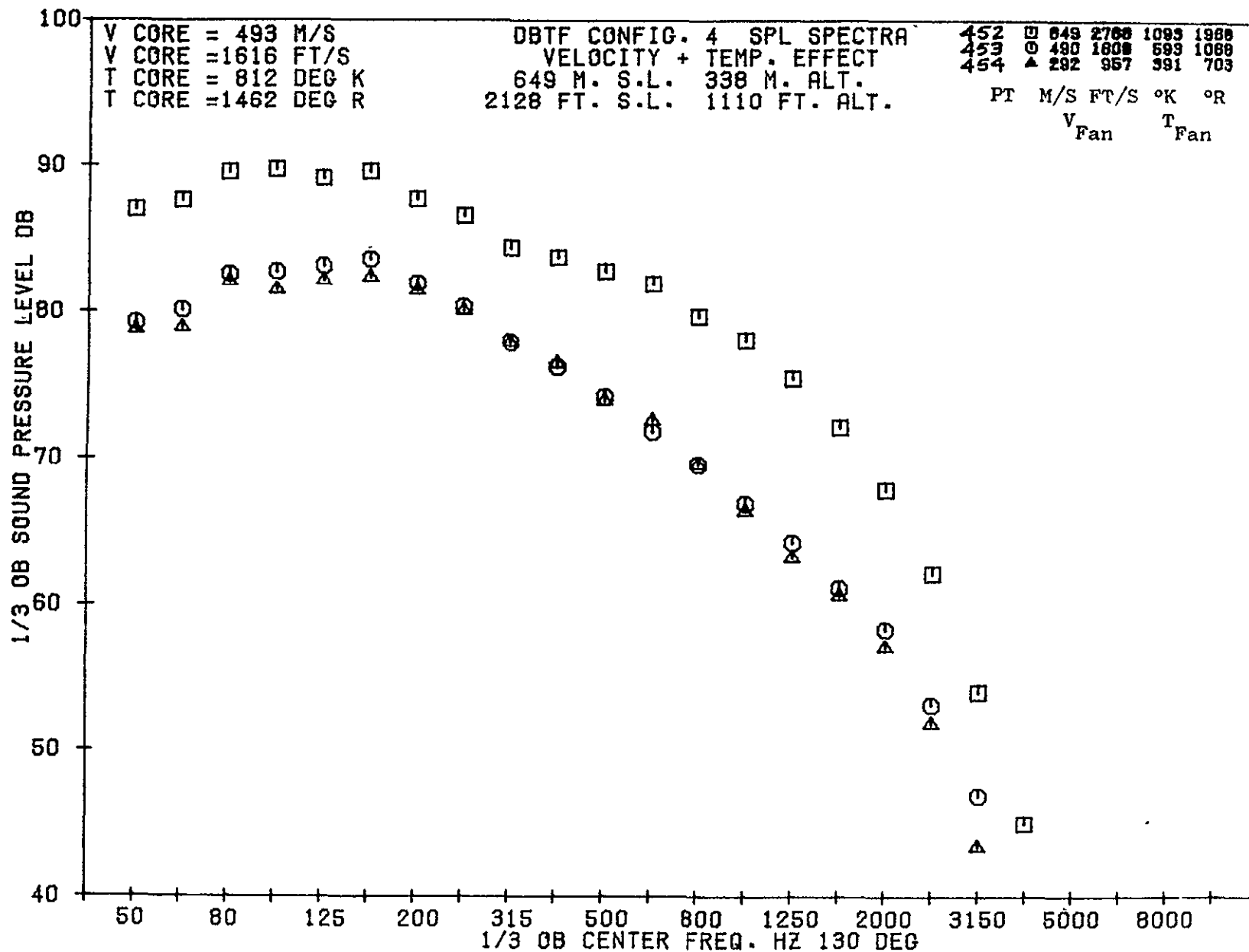


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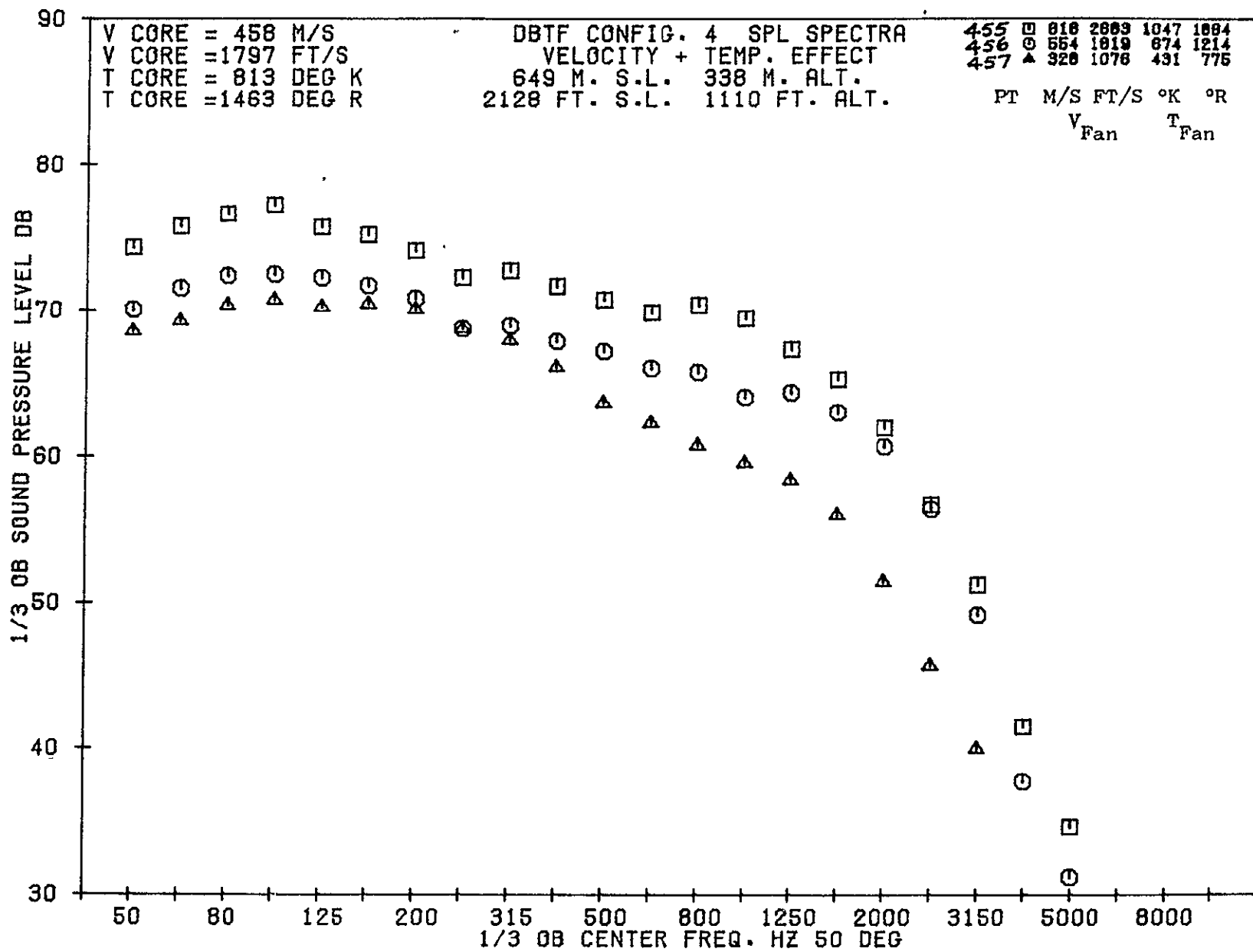
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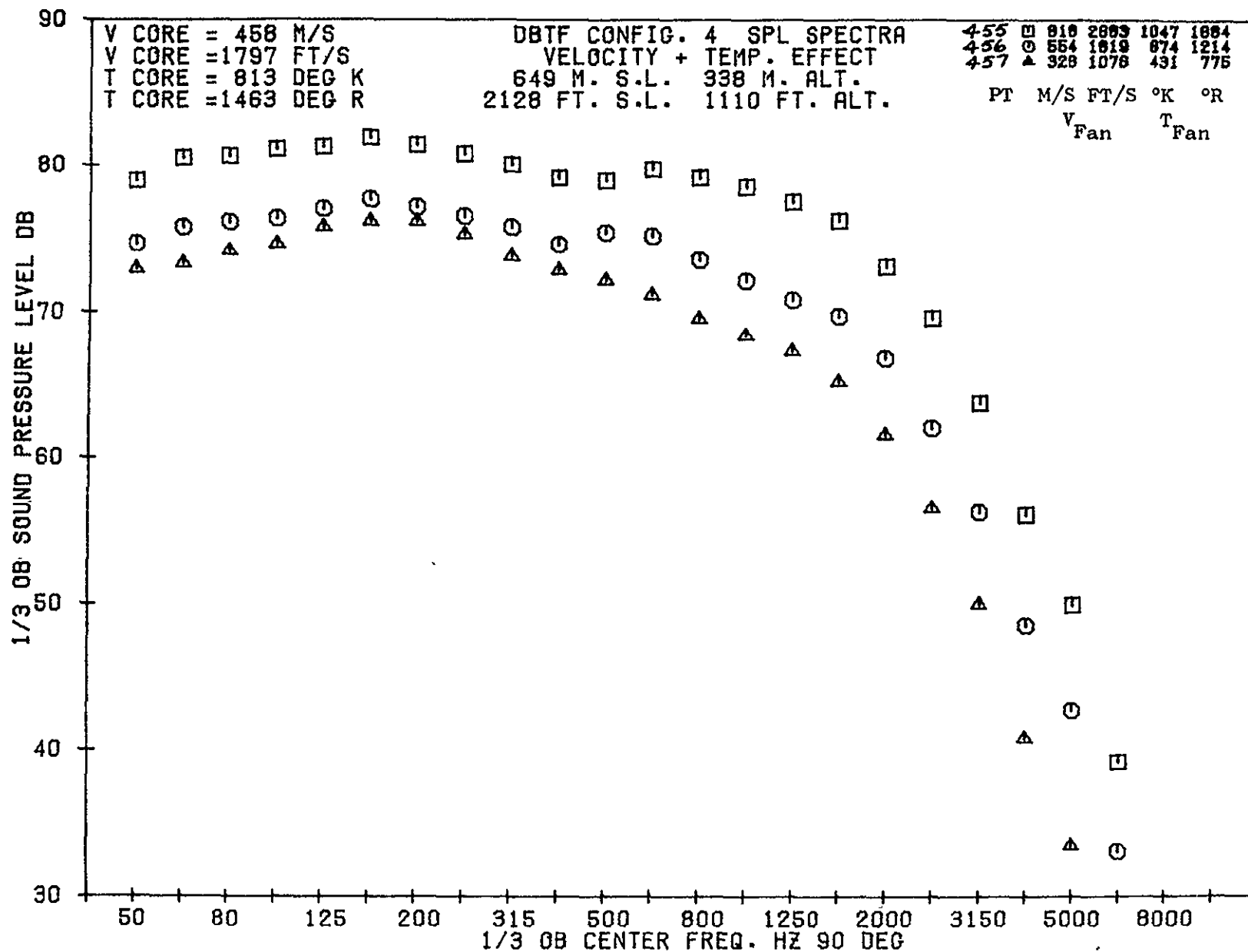
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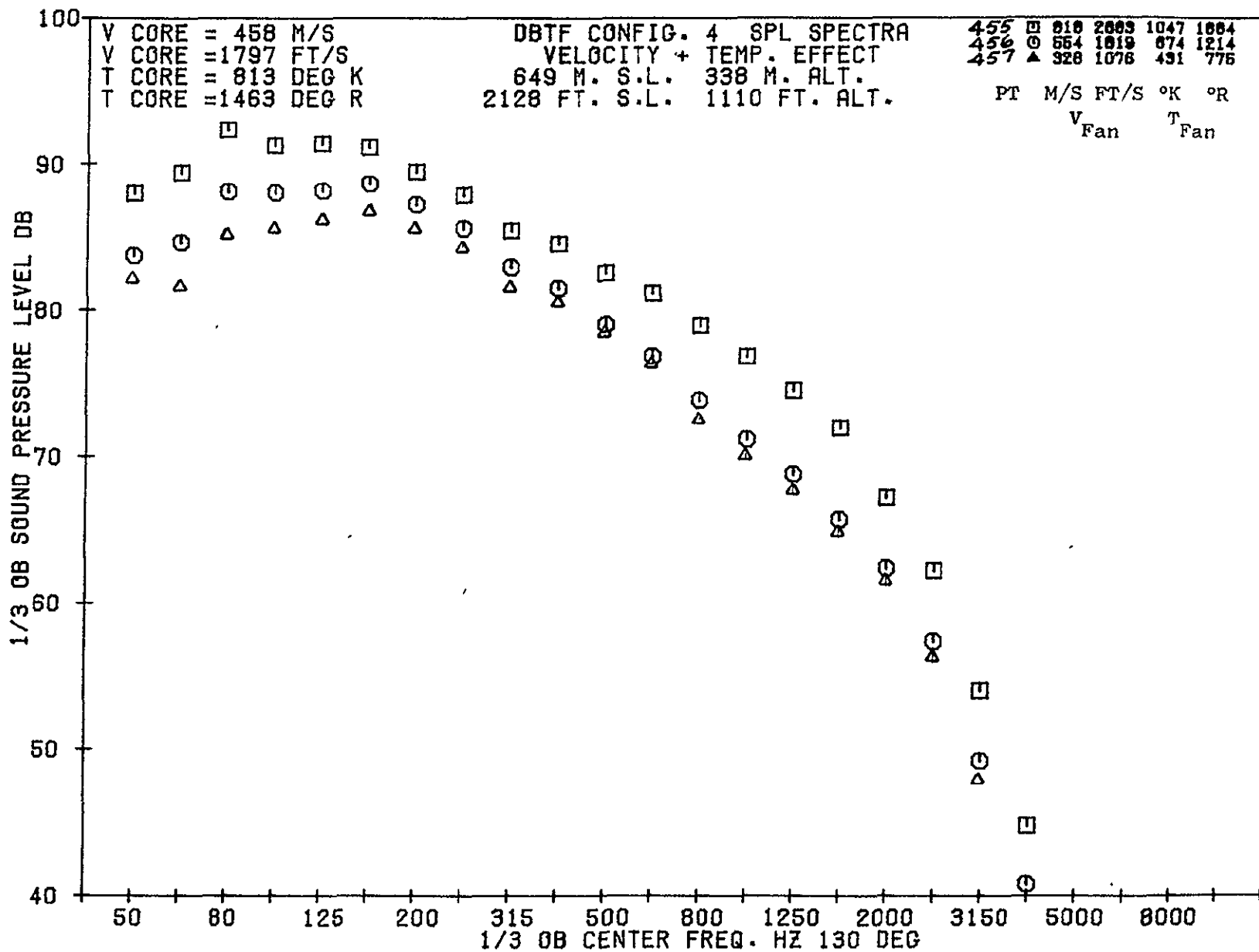
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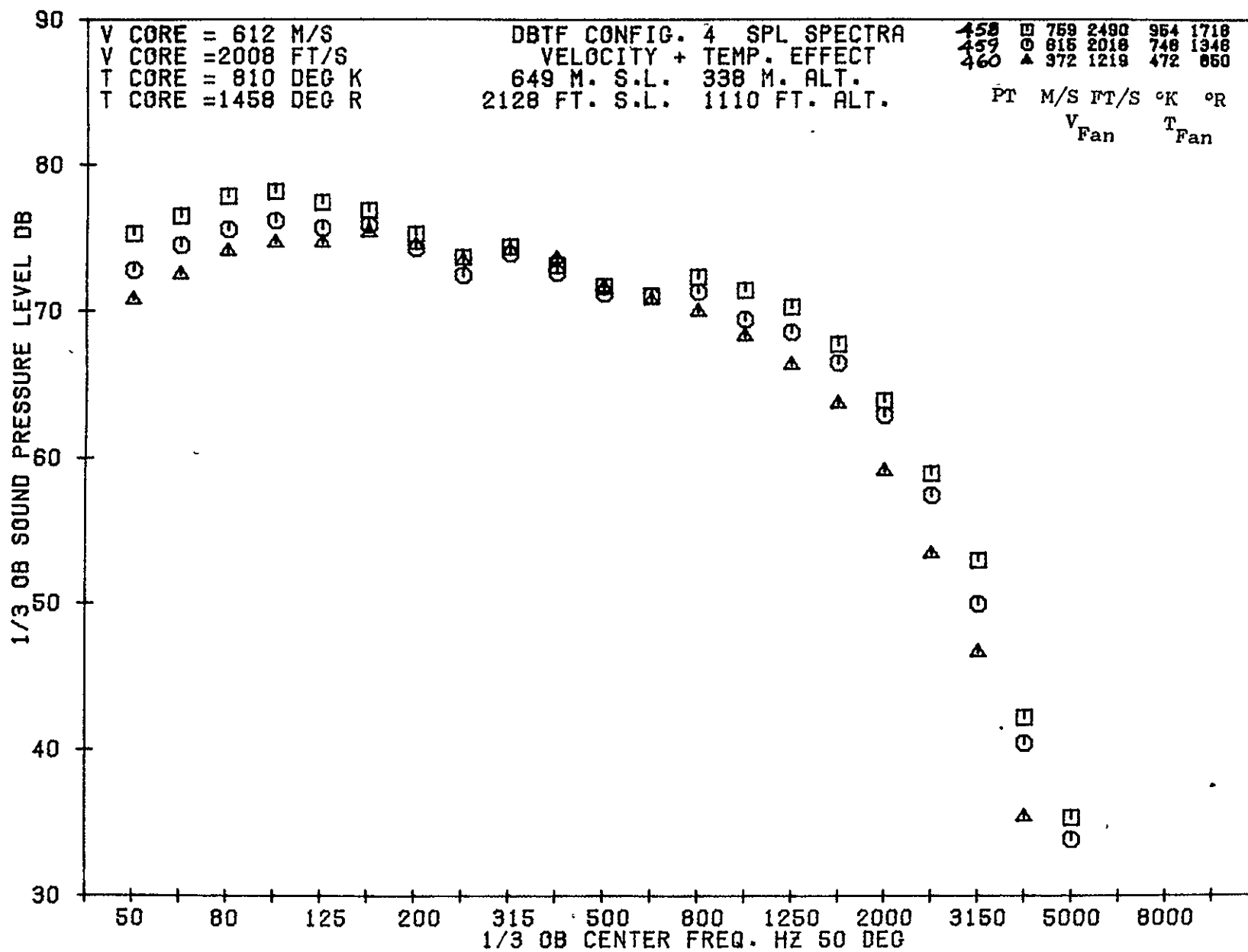


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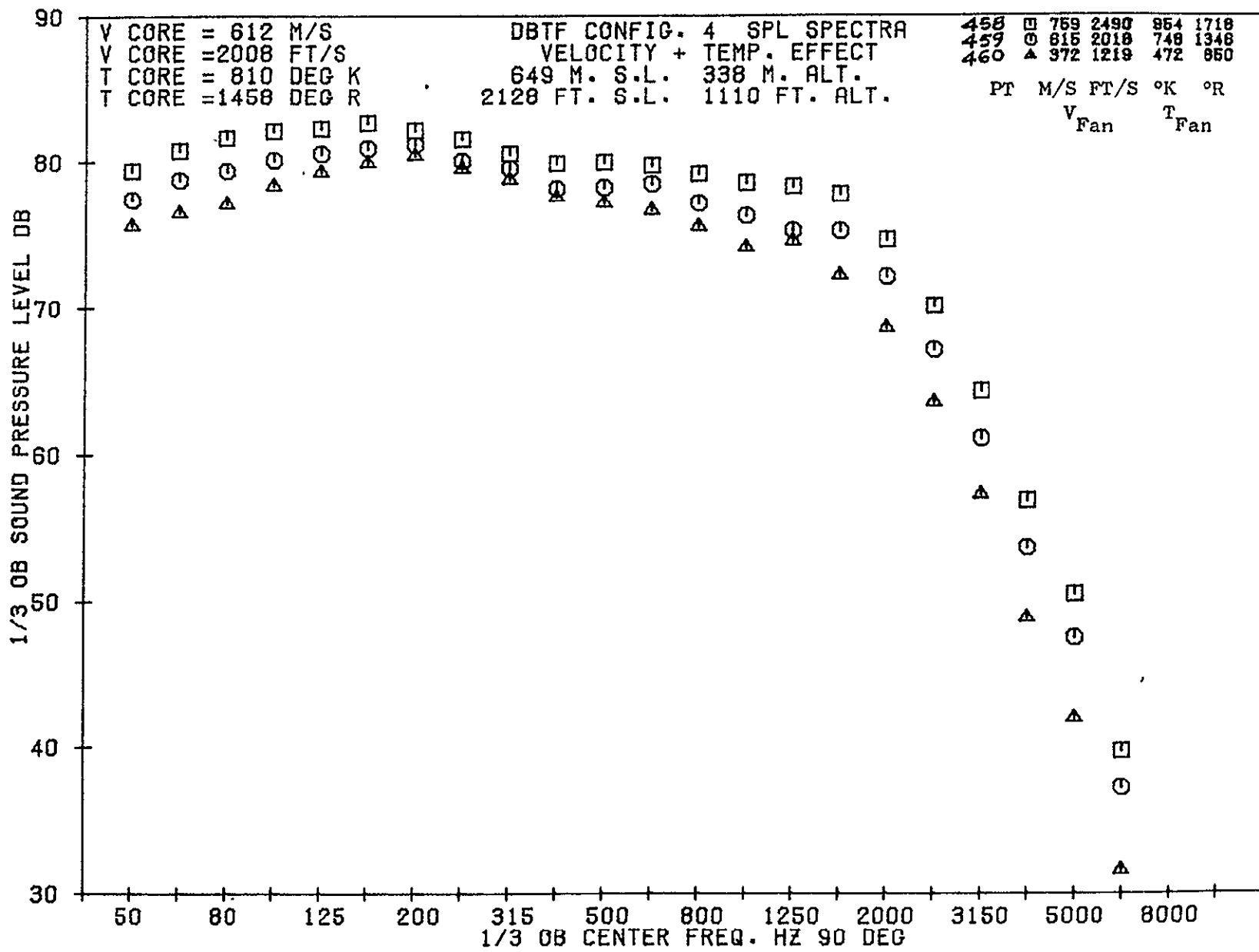
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1452



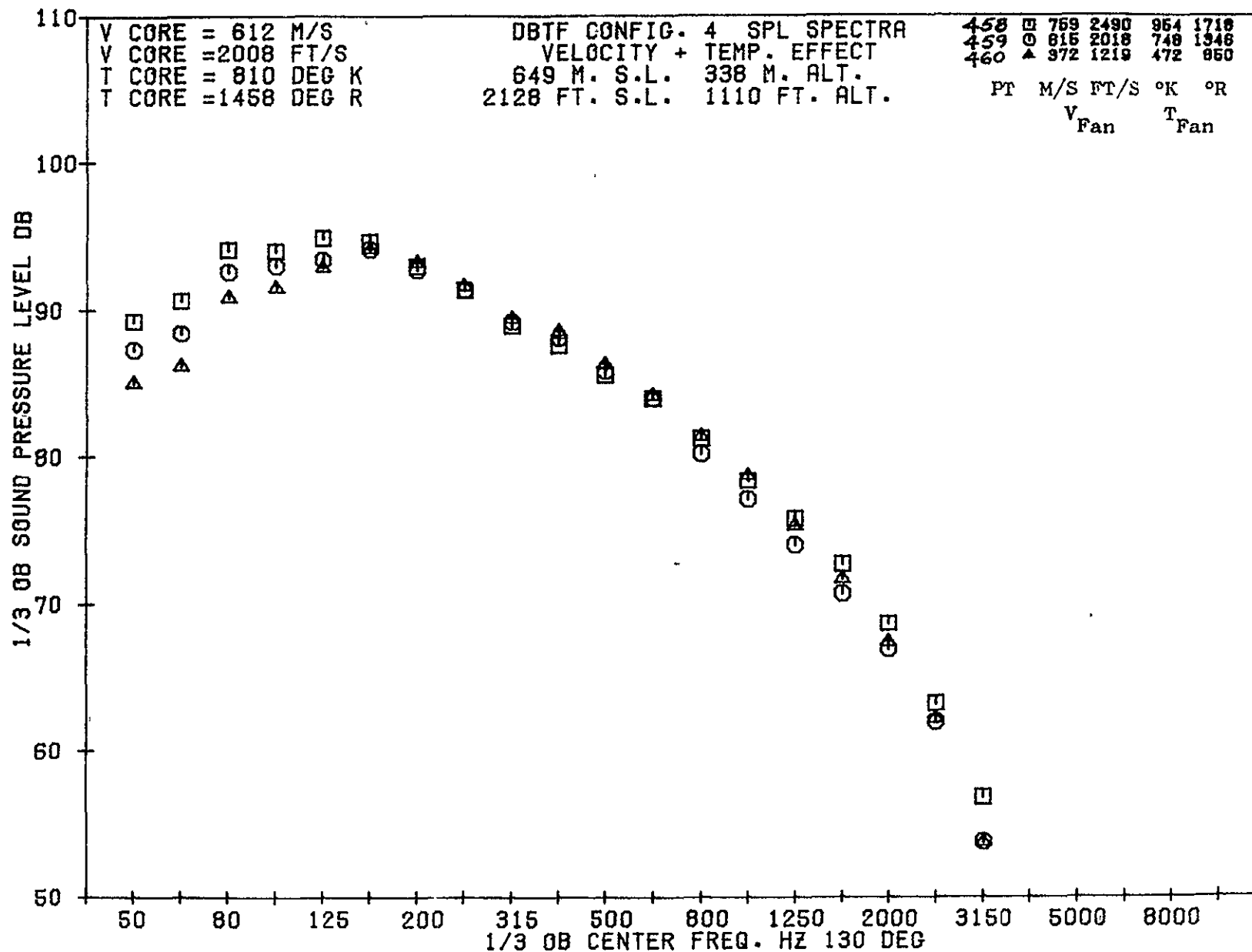
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79 BURC A.



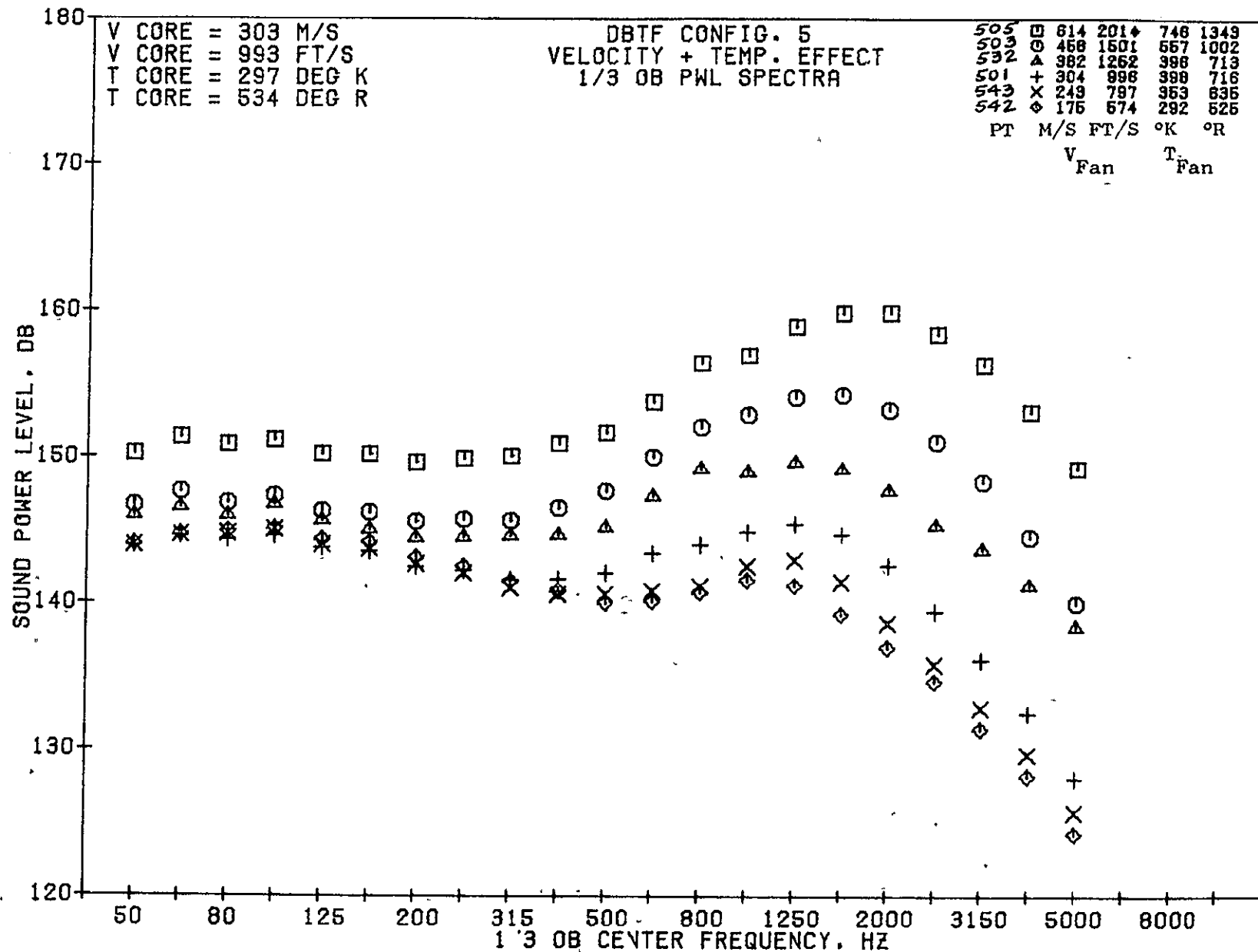
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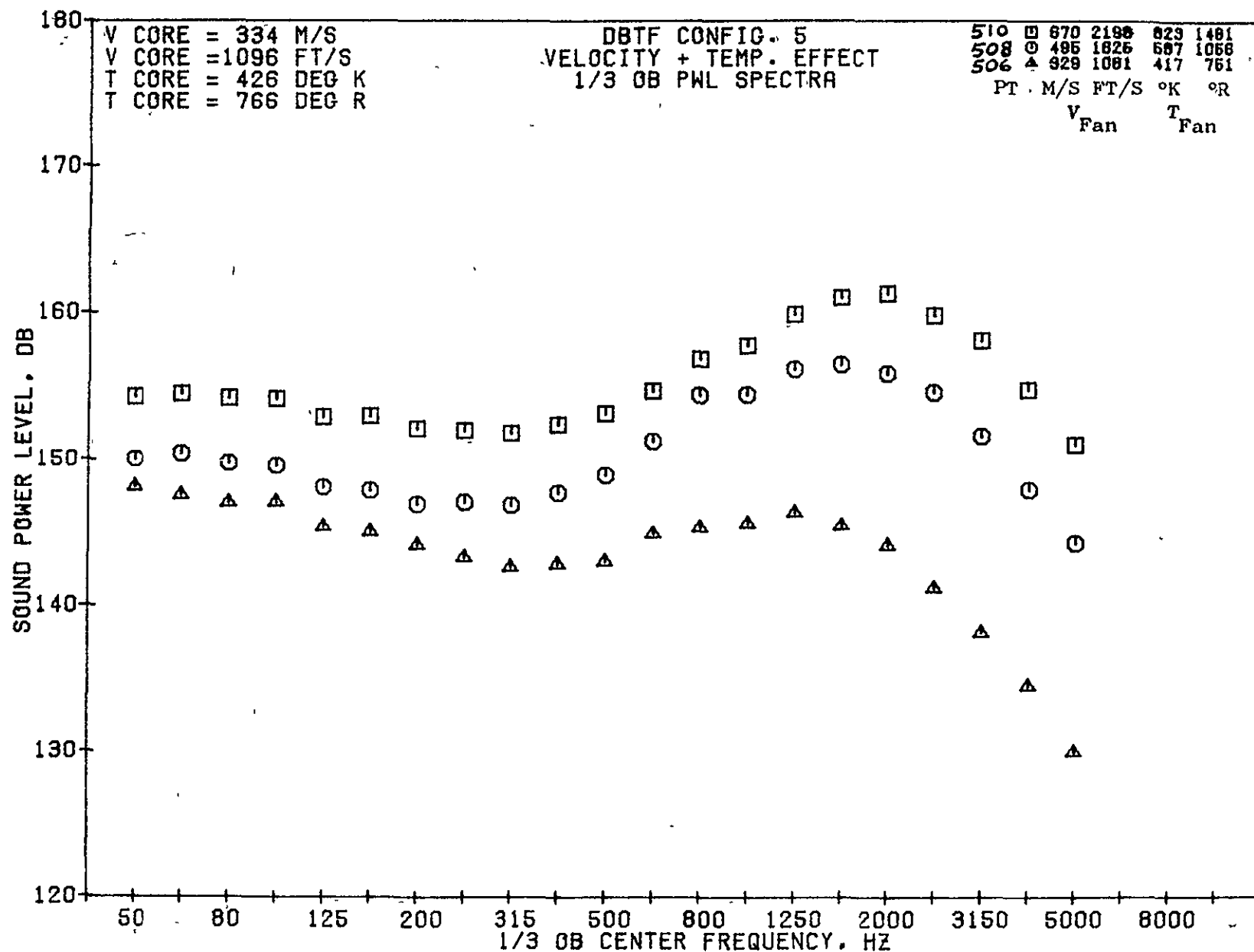
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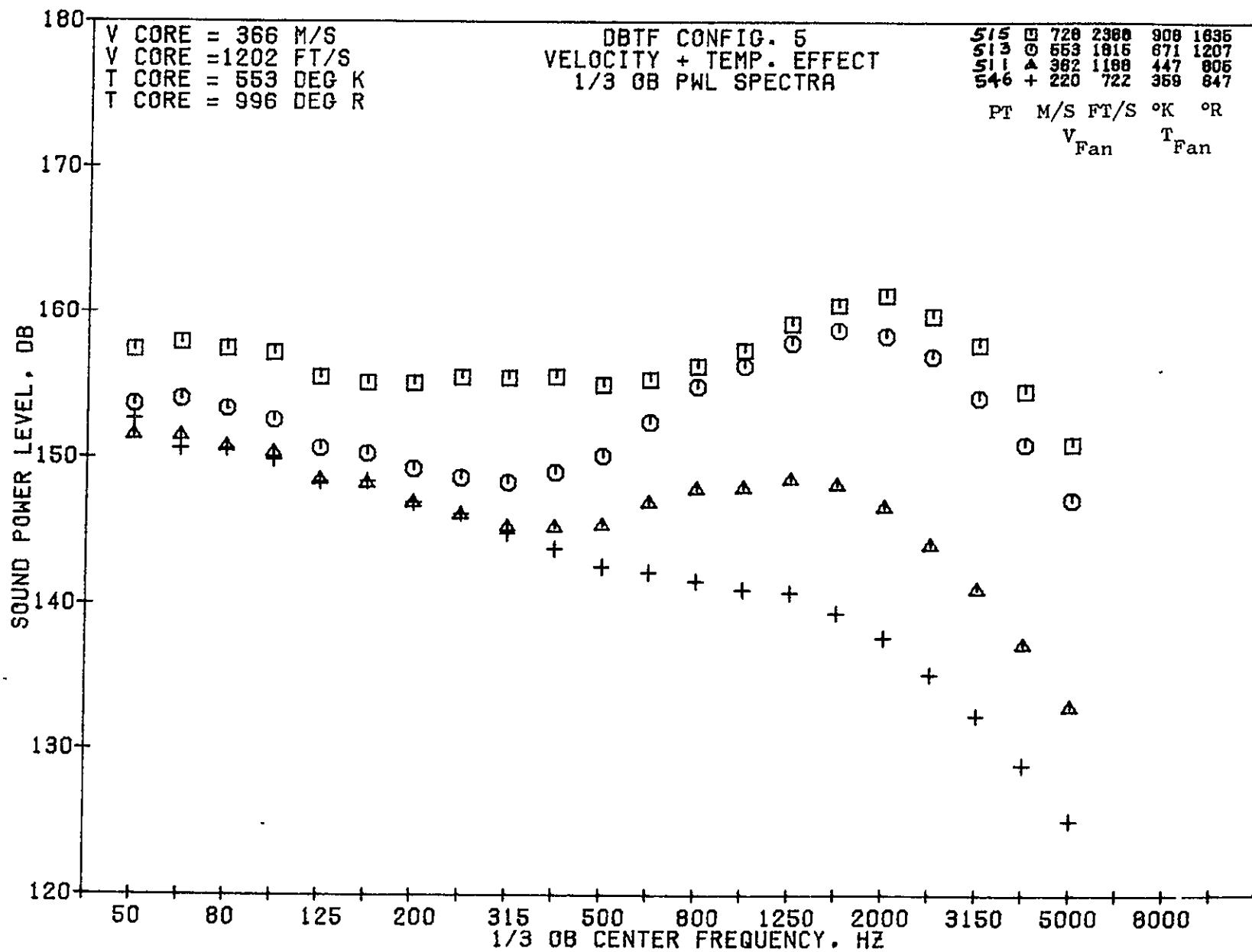
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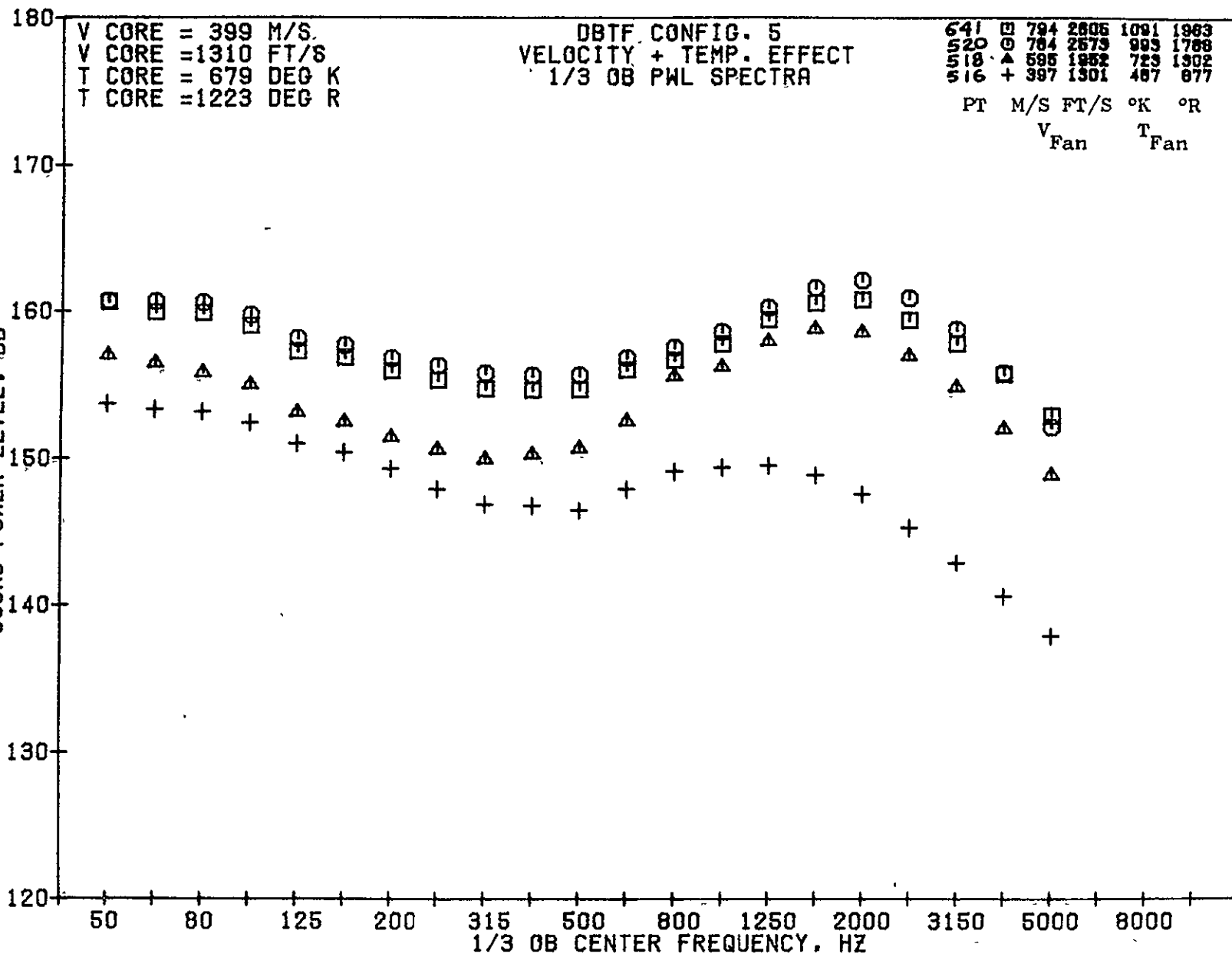
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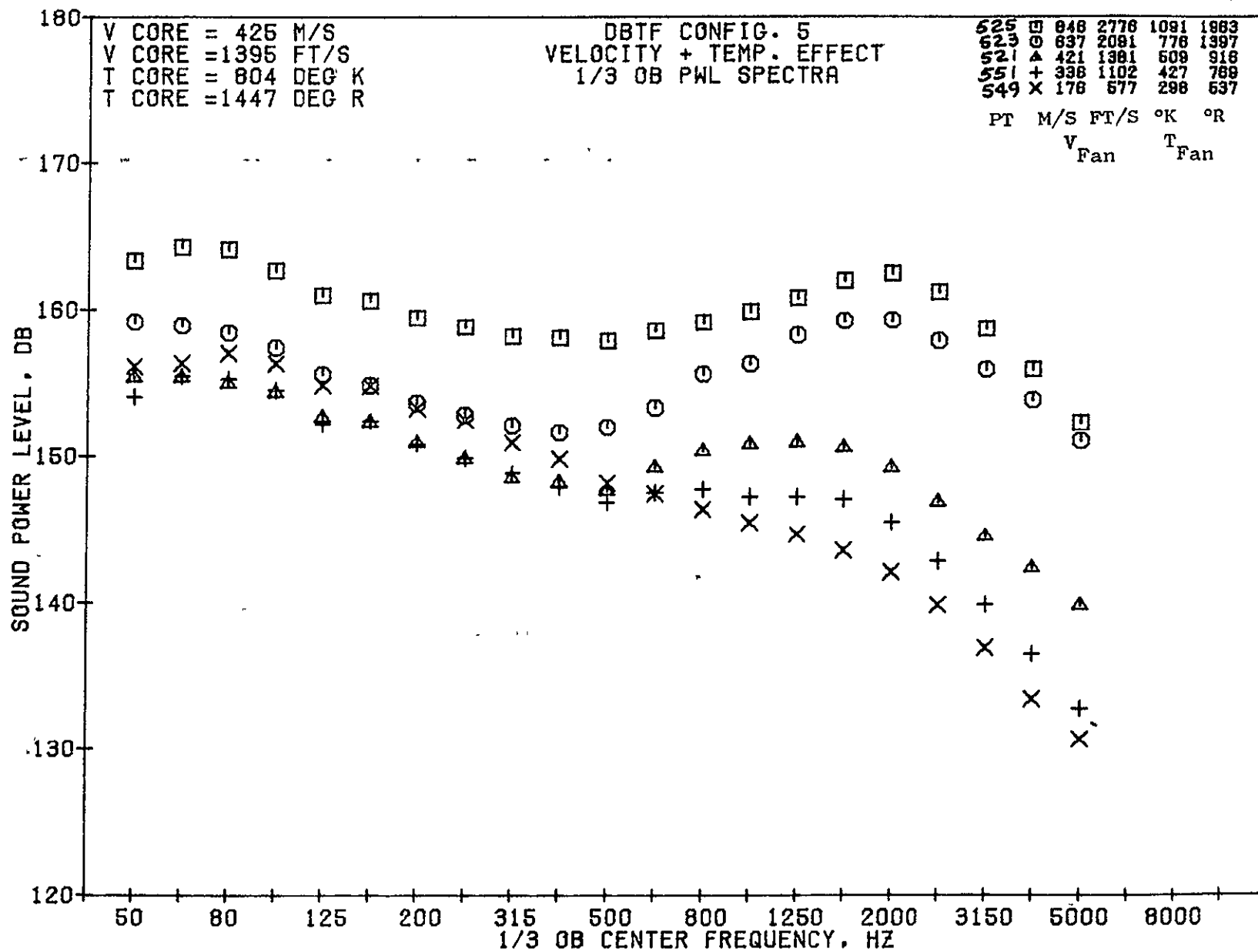
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79 BURCH A.



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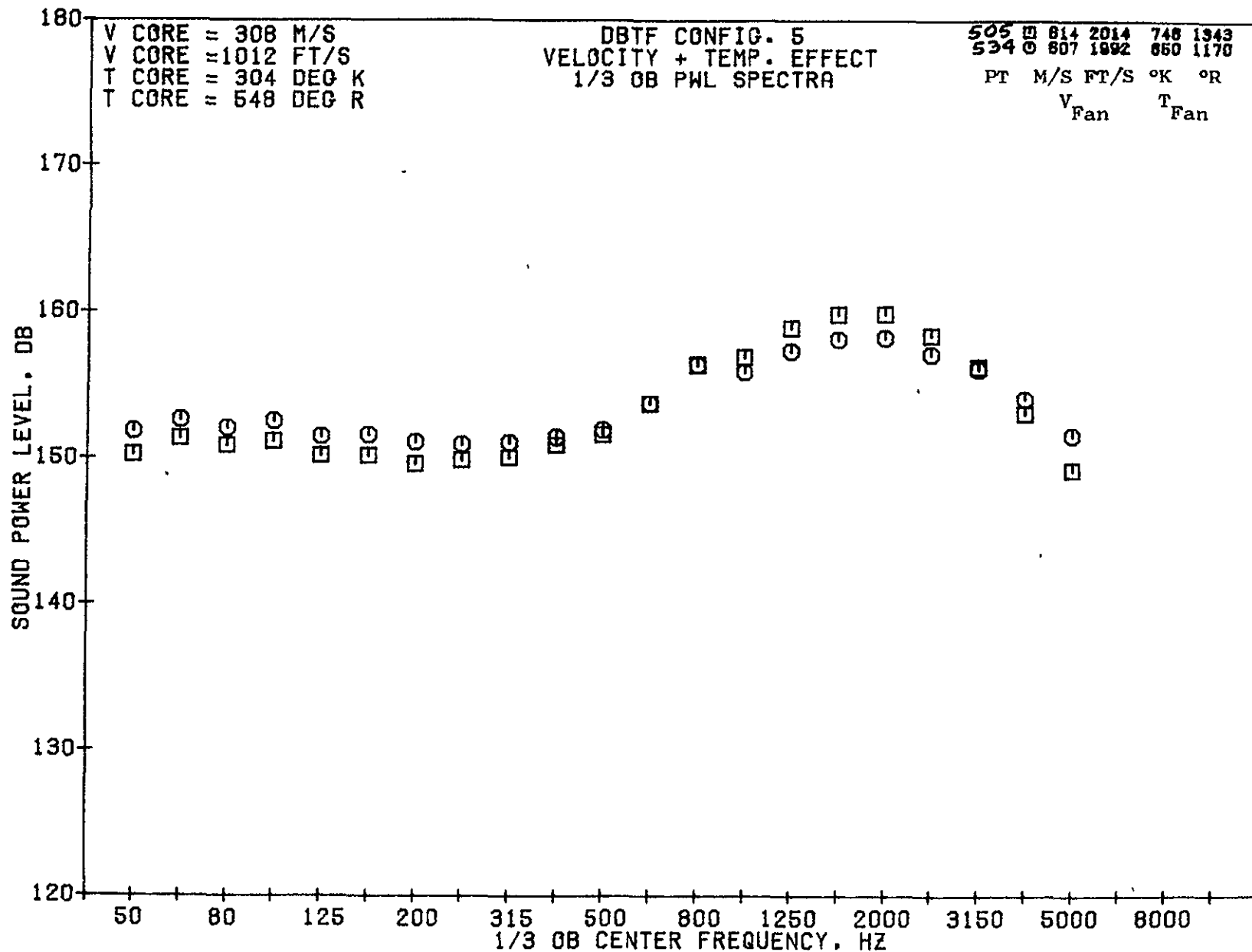


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79 BURCH A.

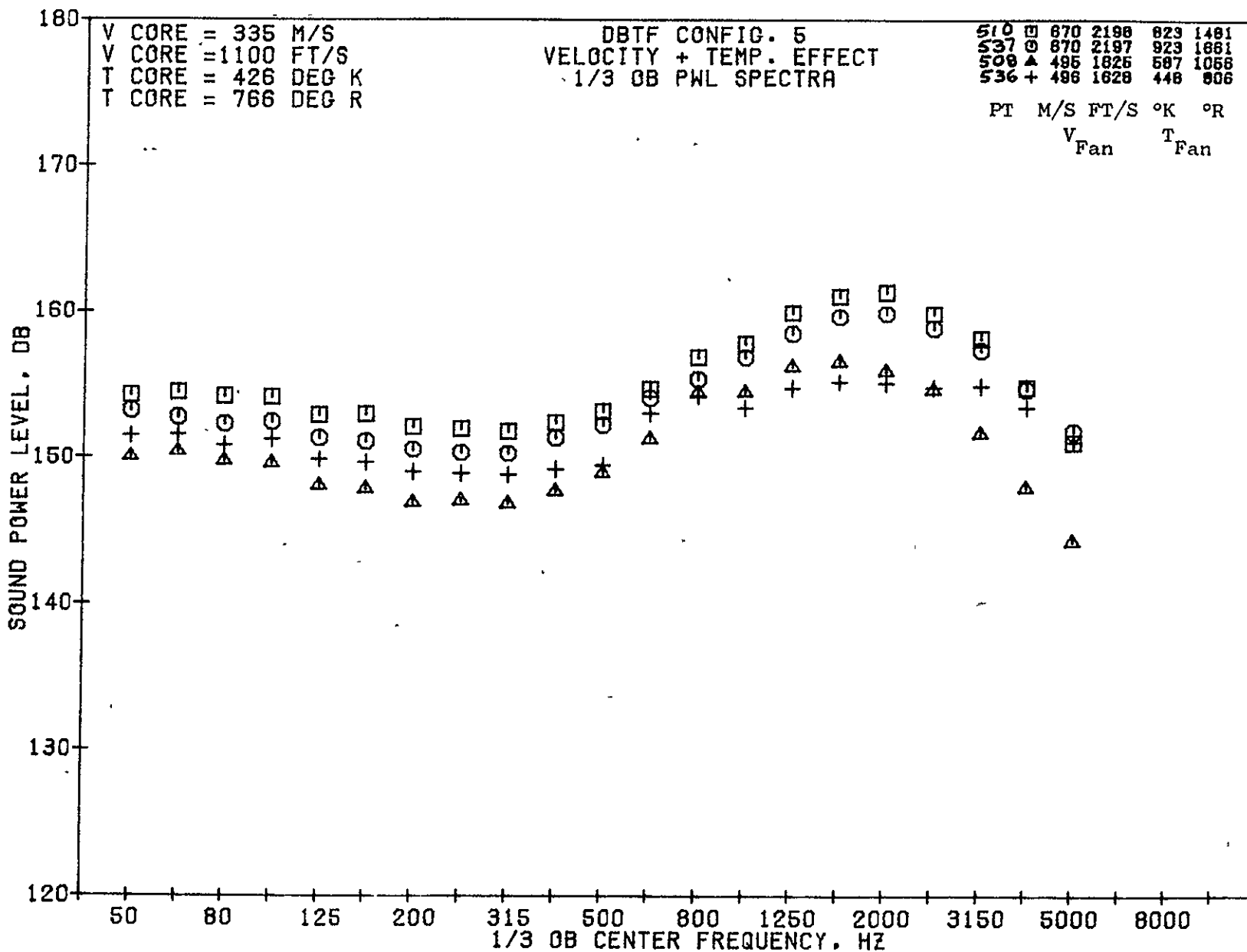
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79 BUR A.

11-225

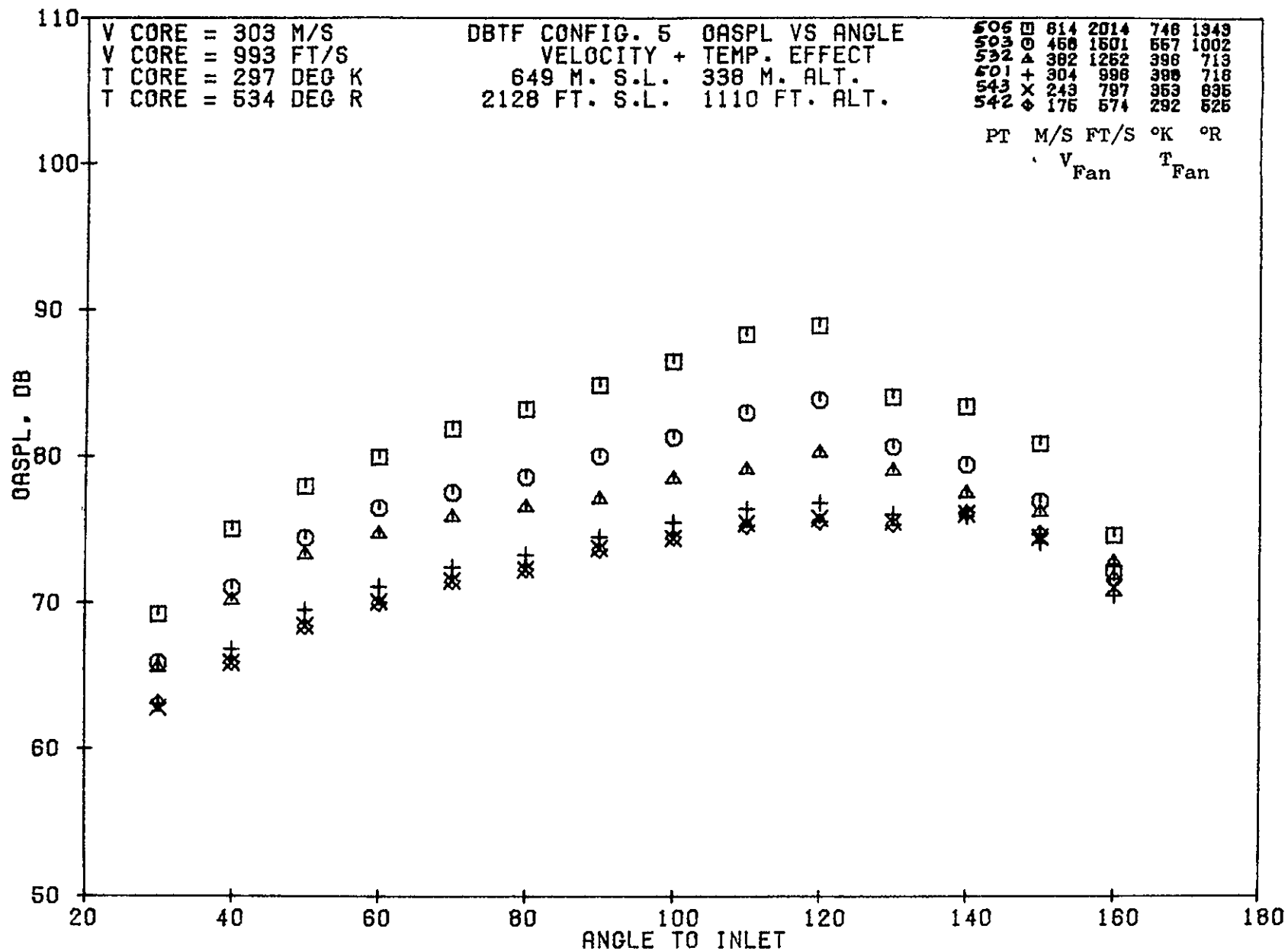


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79 BURCH A.

4-226



08/13/75
5R947-001

79 BURD A.

110
100
90
80
70
60
50

V CORE = 334 M/S
V CORE = 1096 FT/S
T CORE = 426 DEG K
T CORE = 766 DEG R

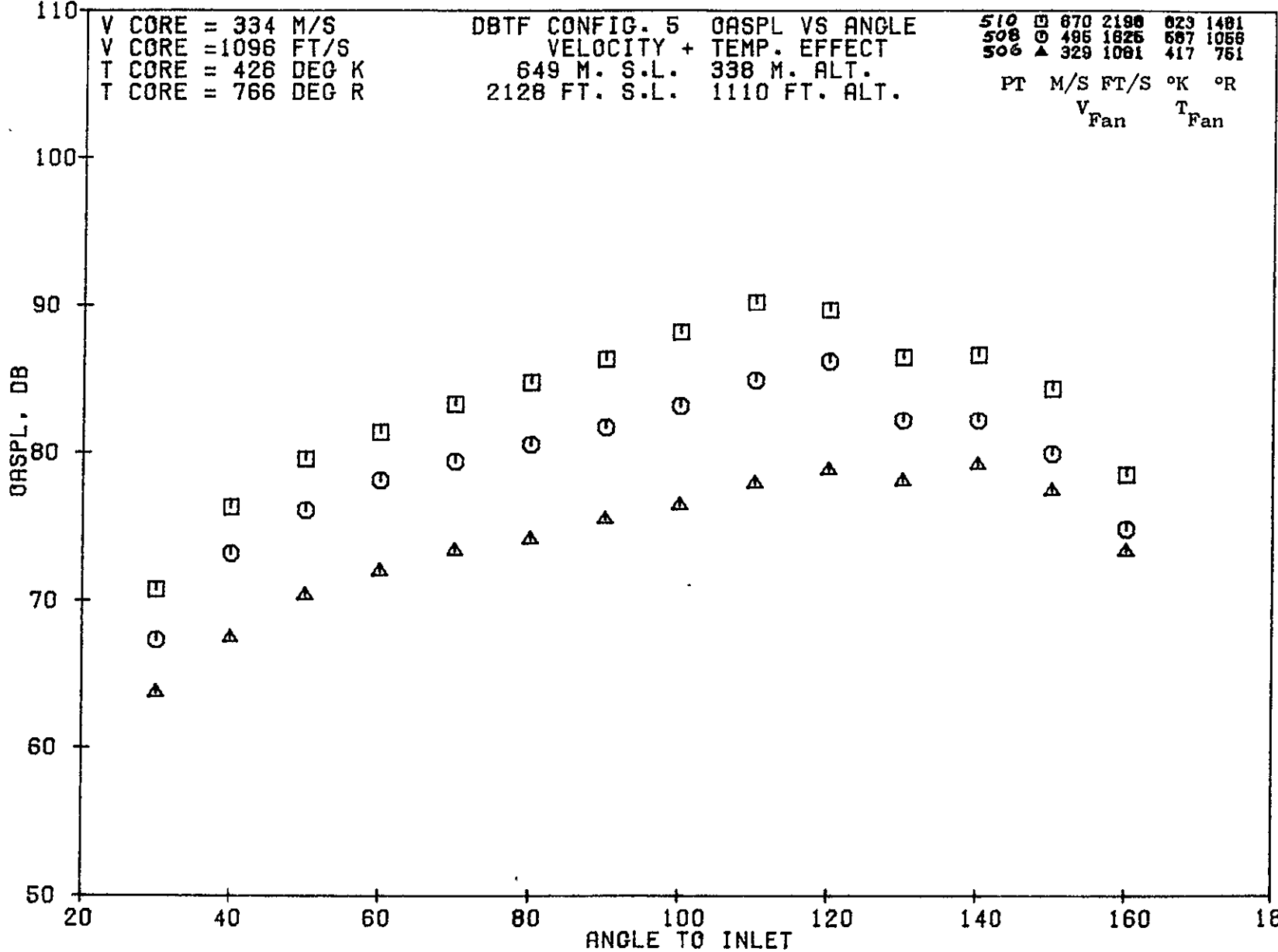
DBTF CONFIG. 5 GASPL VS ANGLE
VELOCITY + TEMP. EFFECT
649 M. S.L. 338 M. ALT.
2128 FT. S.L. 1110 FT. ALT.

PT	M/S	FT/S	°K	°R
	V _{Fan}		T _{Fan}	
510	870	2190	823	1481
508	496	1025	587	1058
506	329	1081	417	761

GASPL, DB

20 40 60 80 100 120 140 160 180

ANGLE TO INLET



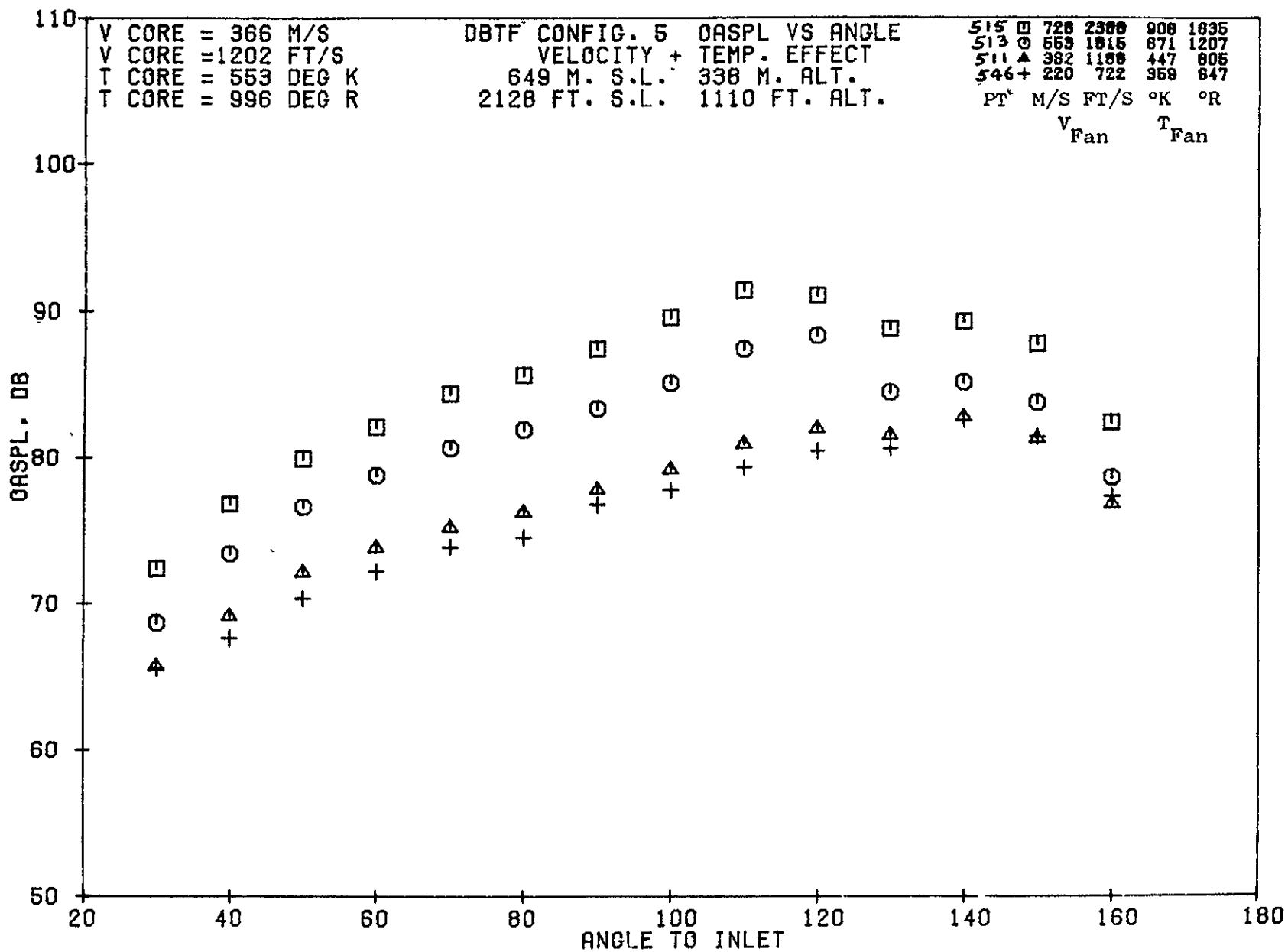
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79 BURCH A.

4-228

1463



08/13/75
5R947-001

79 BURC A.

110
100
90
80
70
60
50

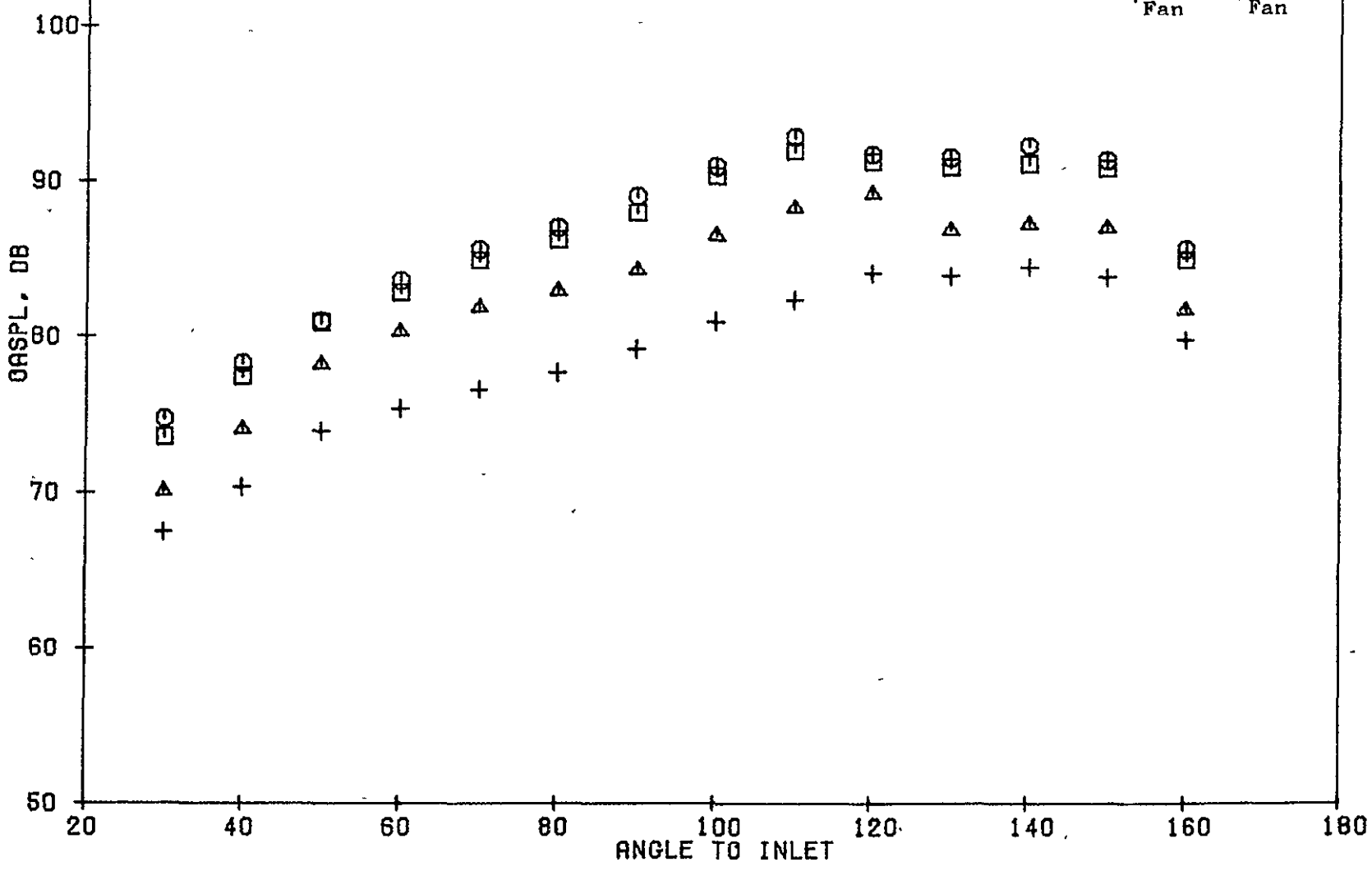
DB

V CORE = 399 M/S
V CORE = 1310 FT/S
T CORE = 679 DEG K
T CORE = 1223 DEG R

DBTF CONFIG. 5 OASPL VS ANGLE
VELOCITY + TEMP. EFFECT
649 M. S.L. 338 M. ALT.
2128 FT. S.L. 1110 FT. ALT.

PT	M/S	FT/S	°K	°R
541	794	2806	1091	1983
520	784	2673	993	1788
518	695	1962	723	1302
516	397	1301	487	877

V_{Fan} T_{Fan}

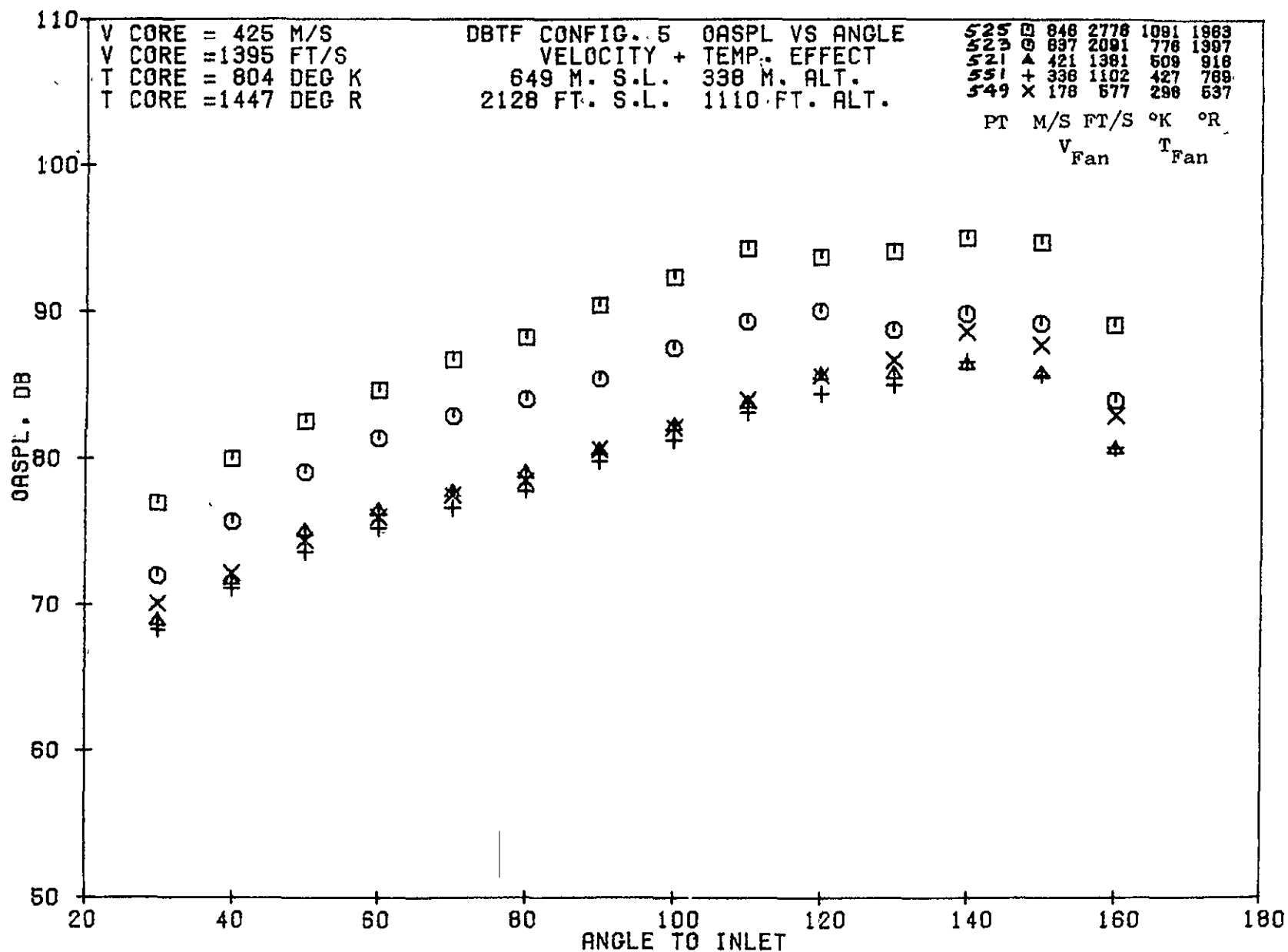


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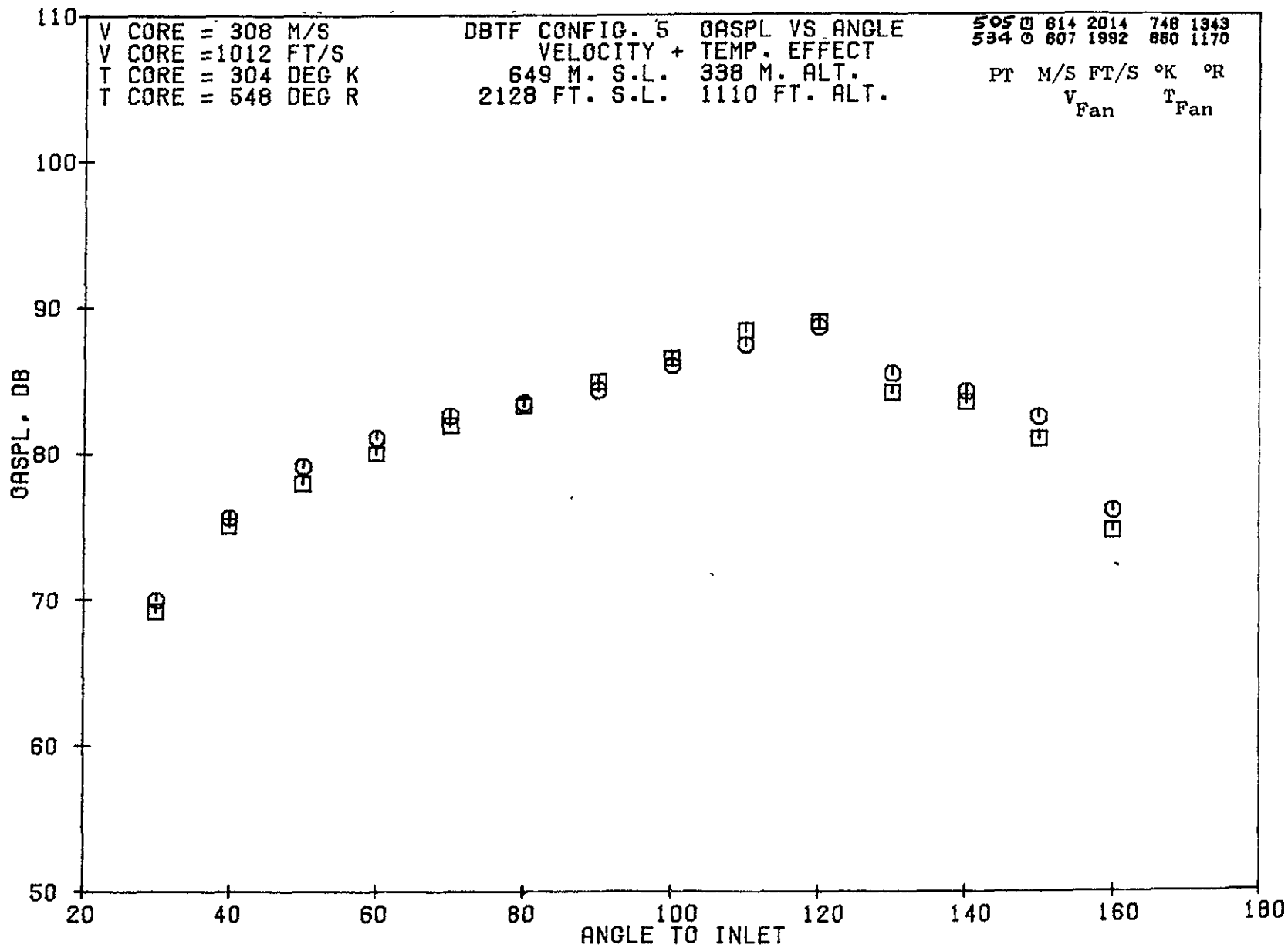
08/20/75
5R552-001

79 BURCH A.



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5R947-001

79 BURD A.



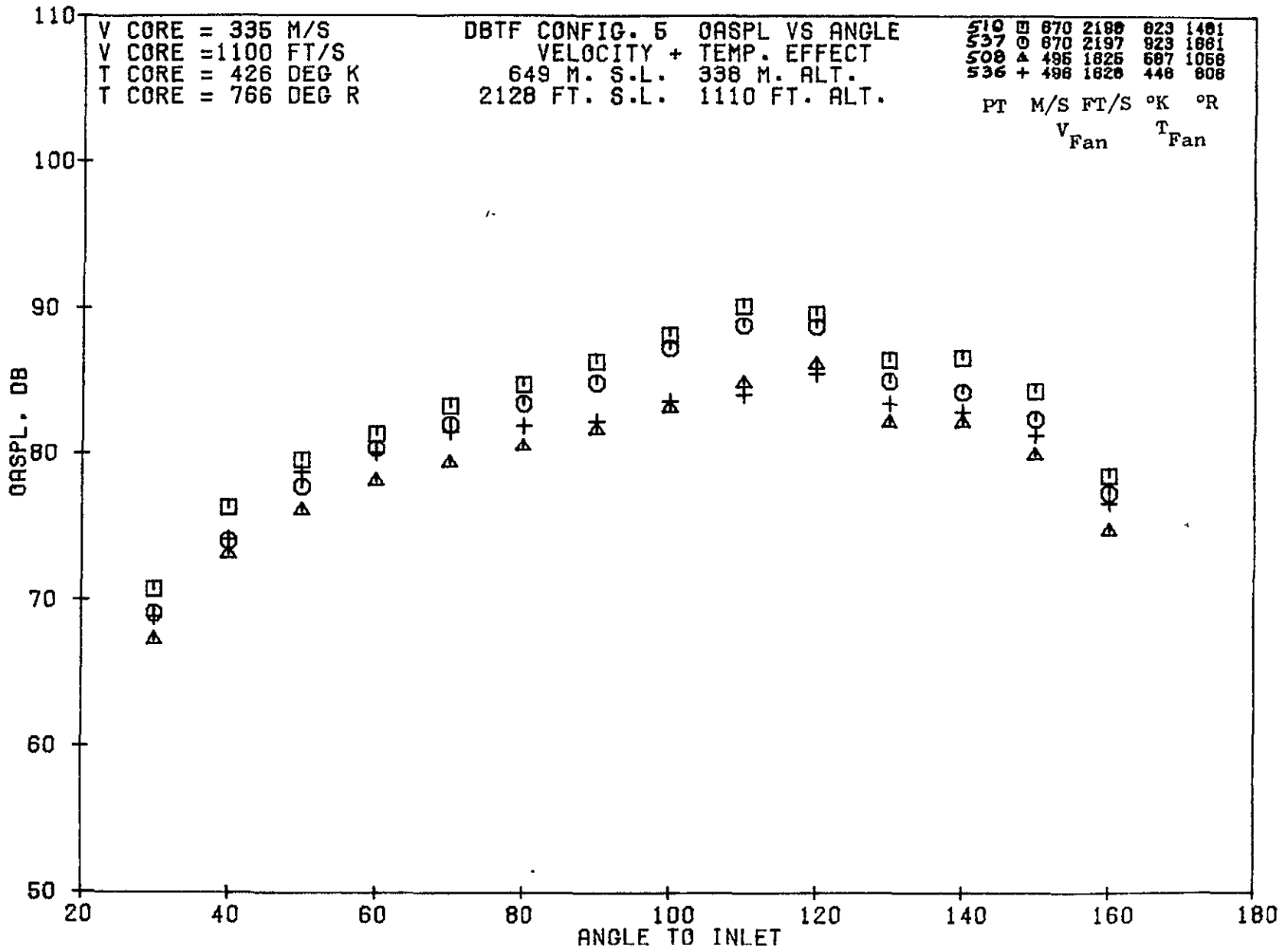
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08/13/75
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79 BURCH A.

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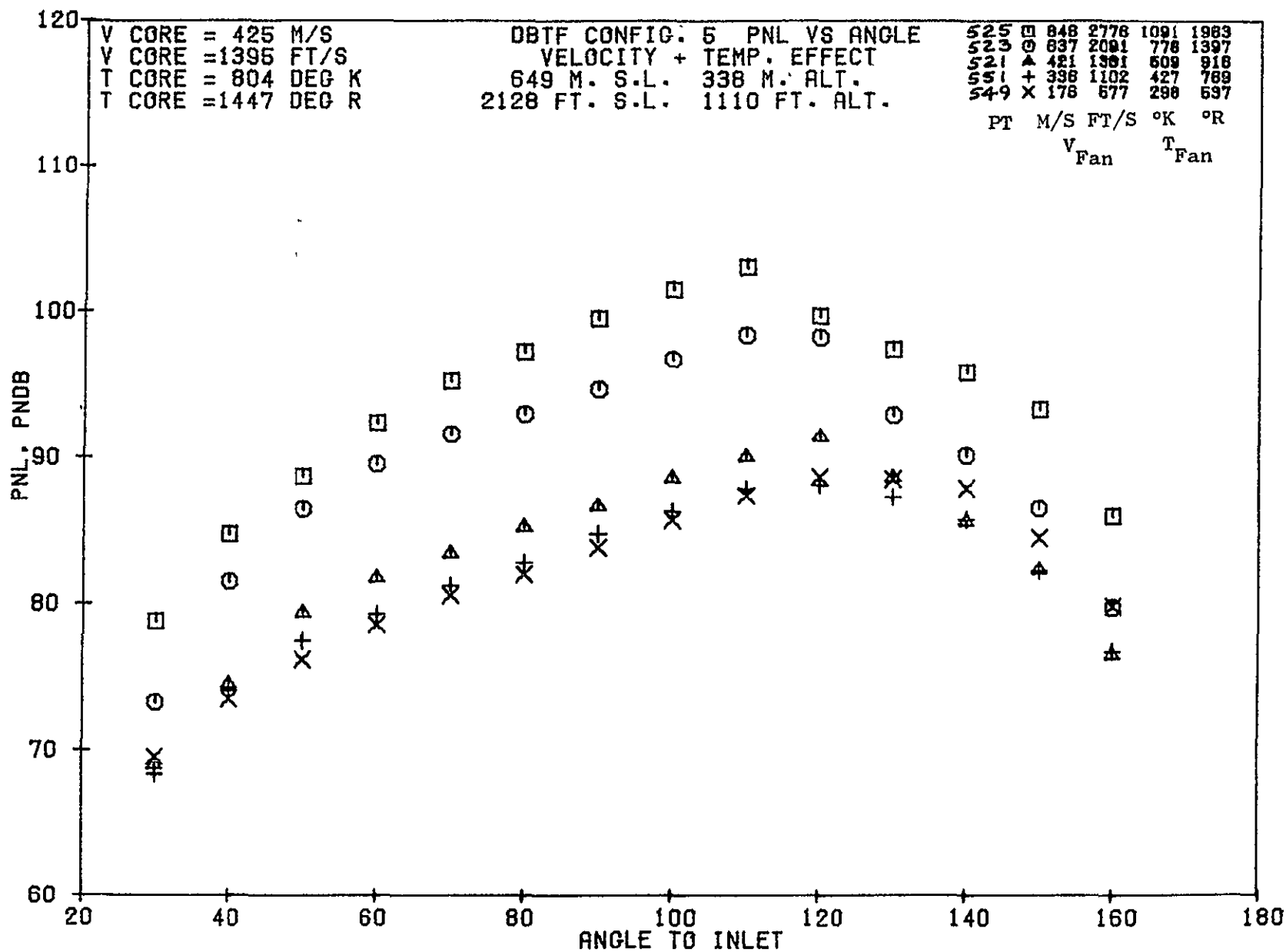
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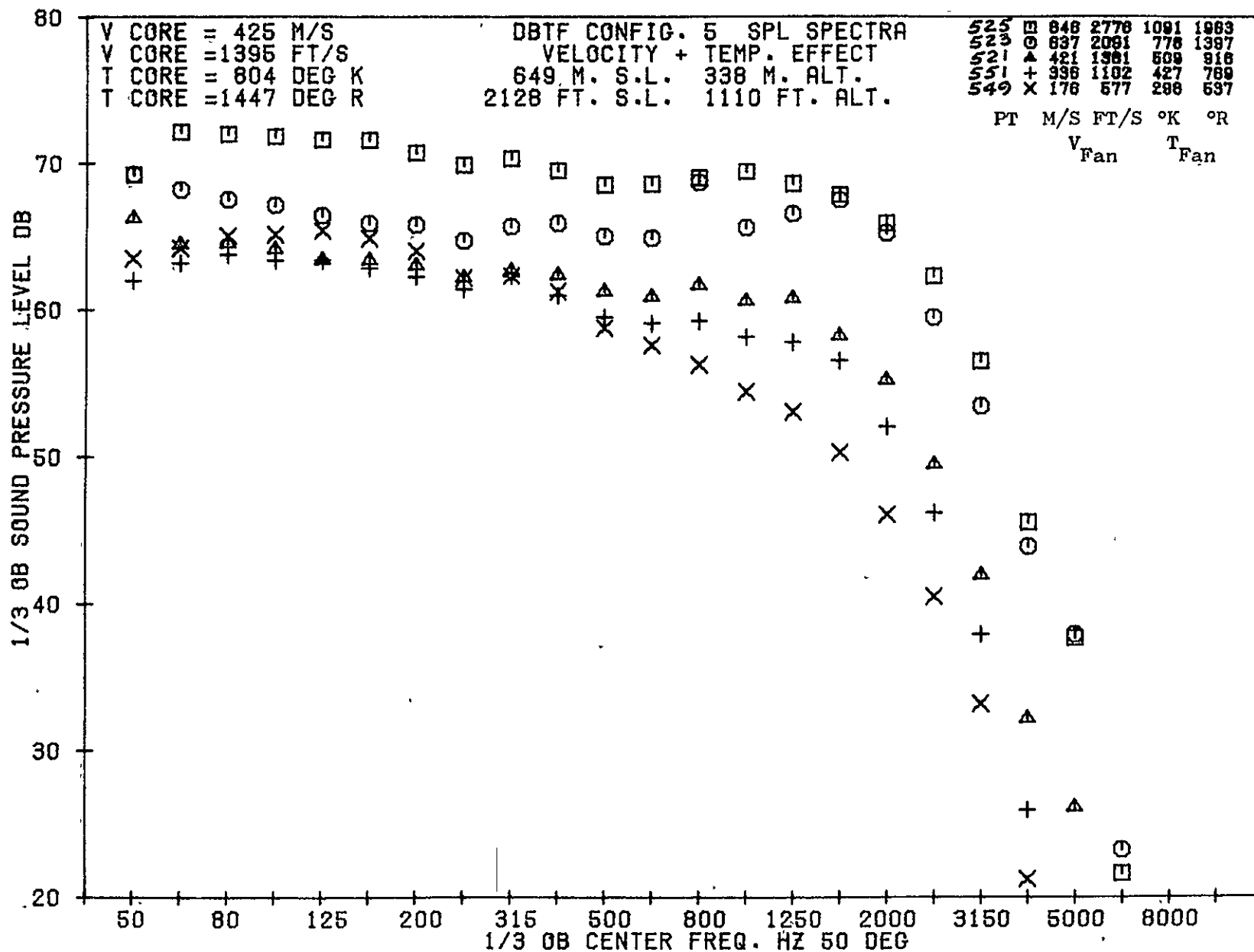
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79 BURCH A.

1469

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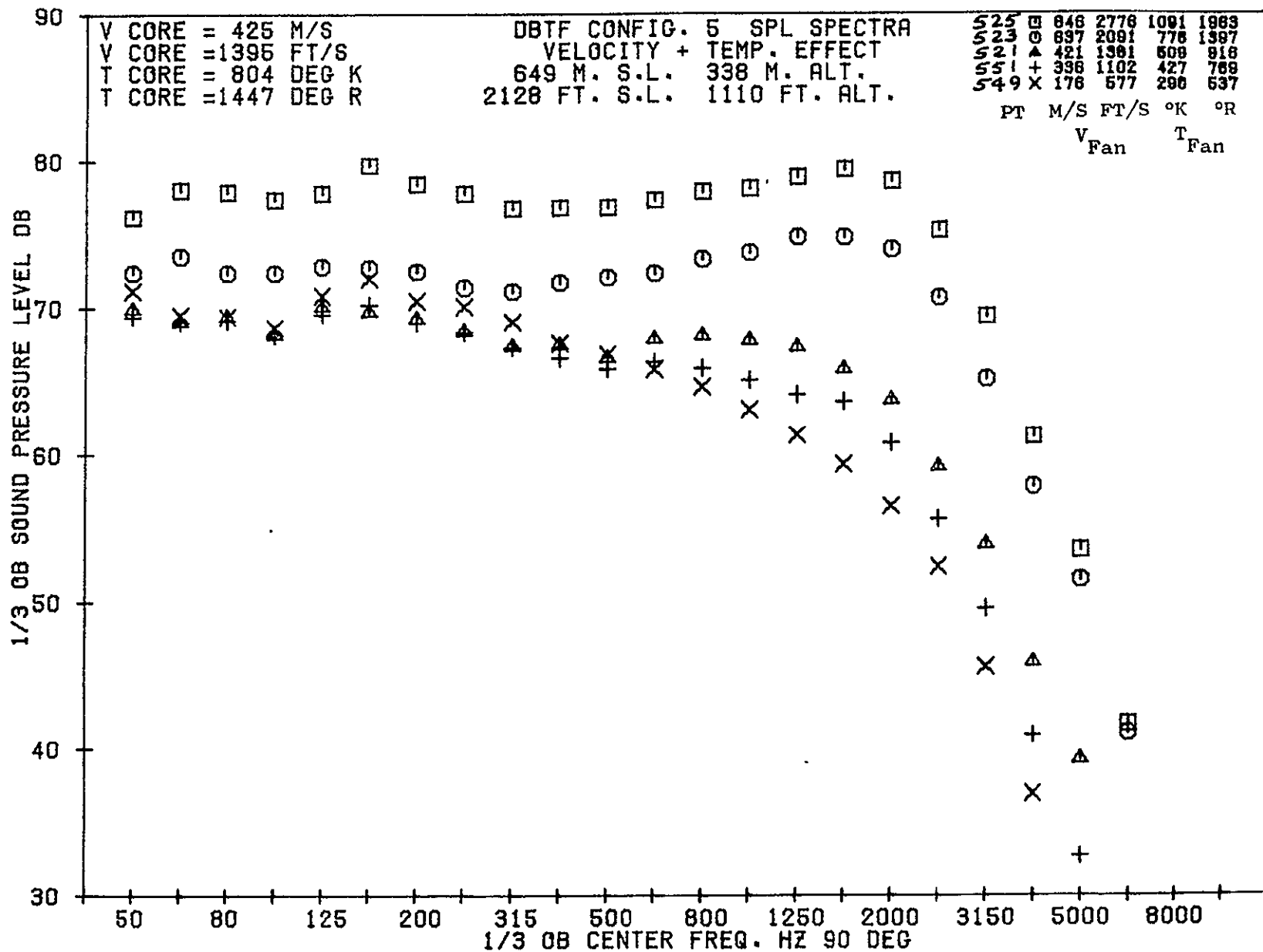
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79 BURCH A.

4-235

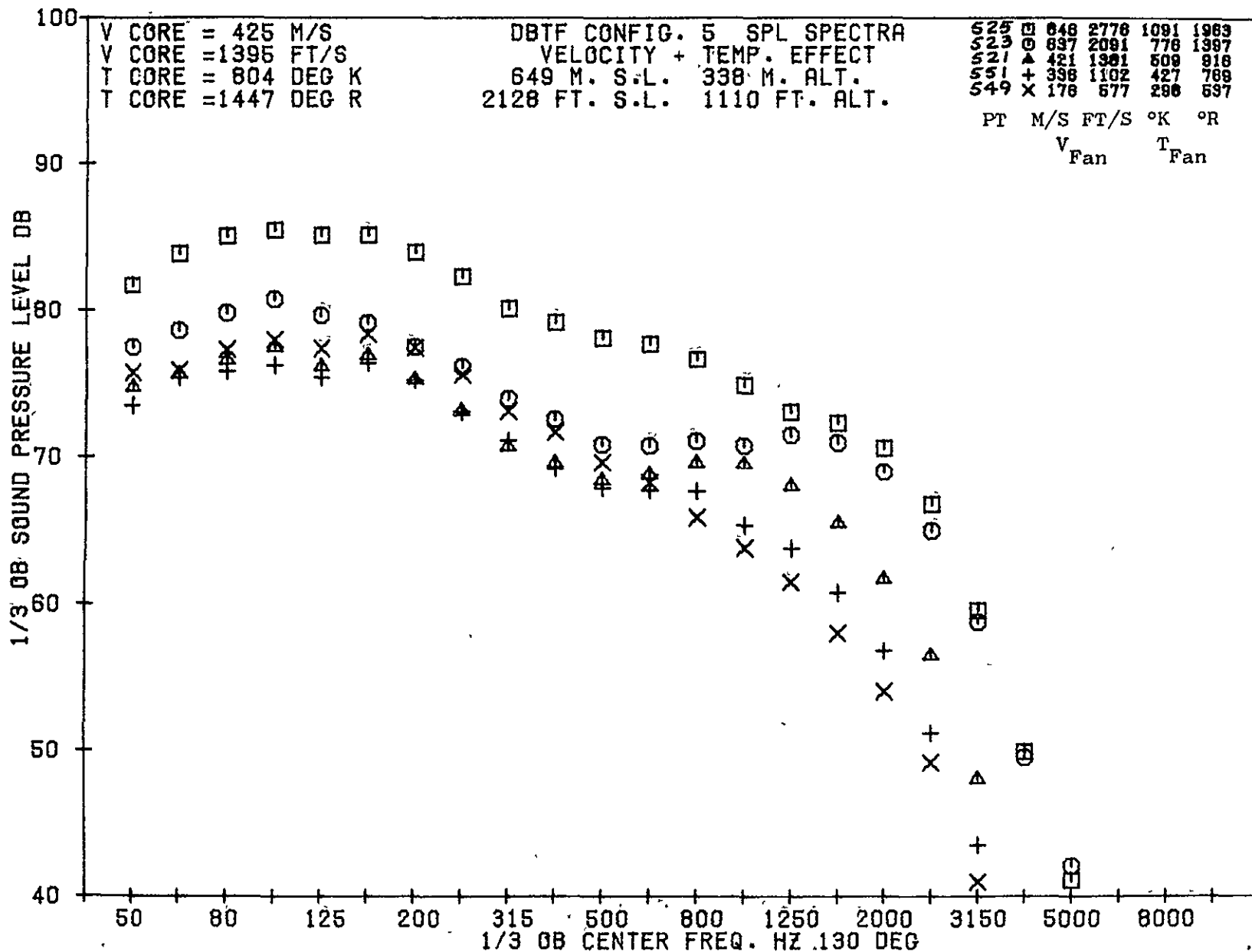


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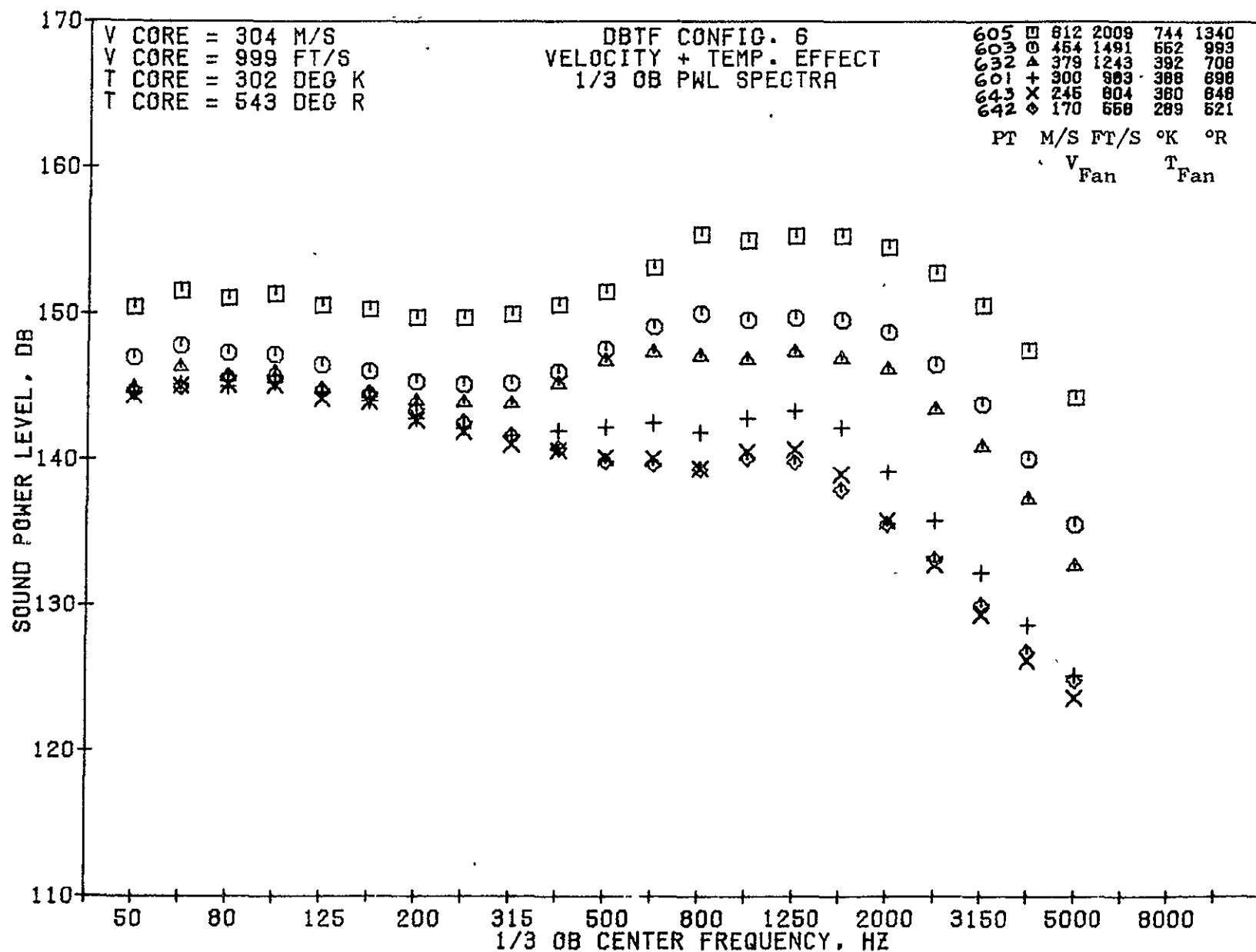
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79 BURCH A.



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5R552-001

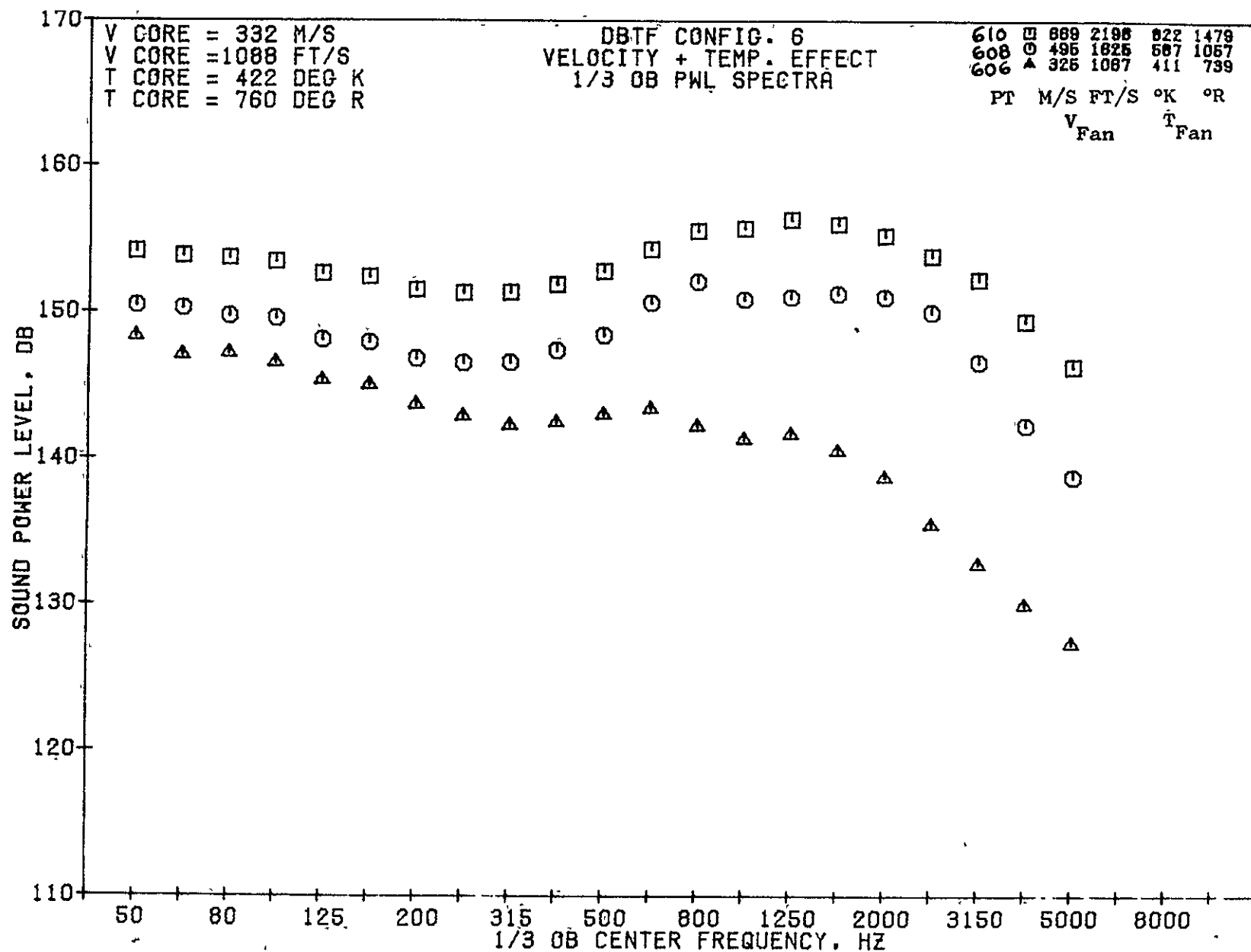
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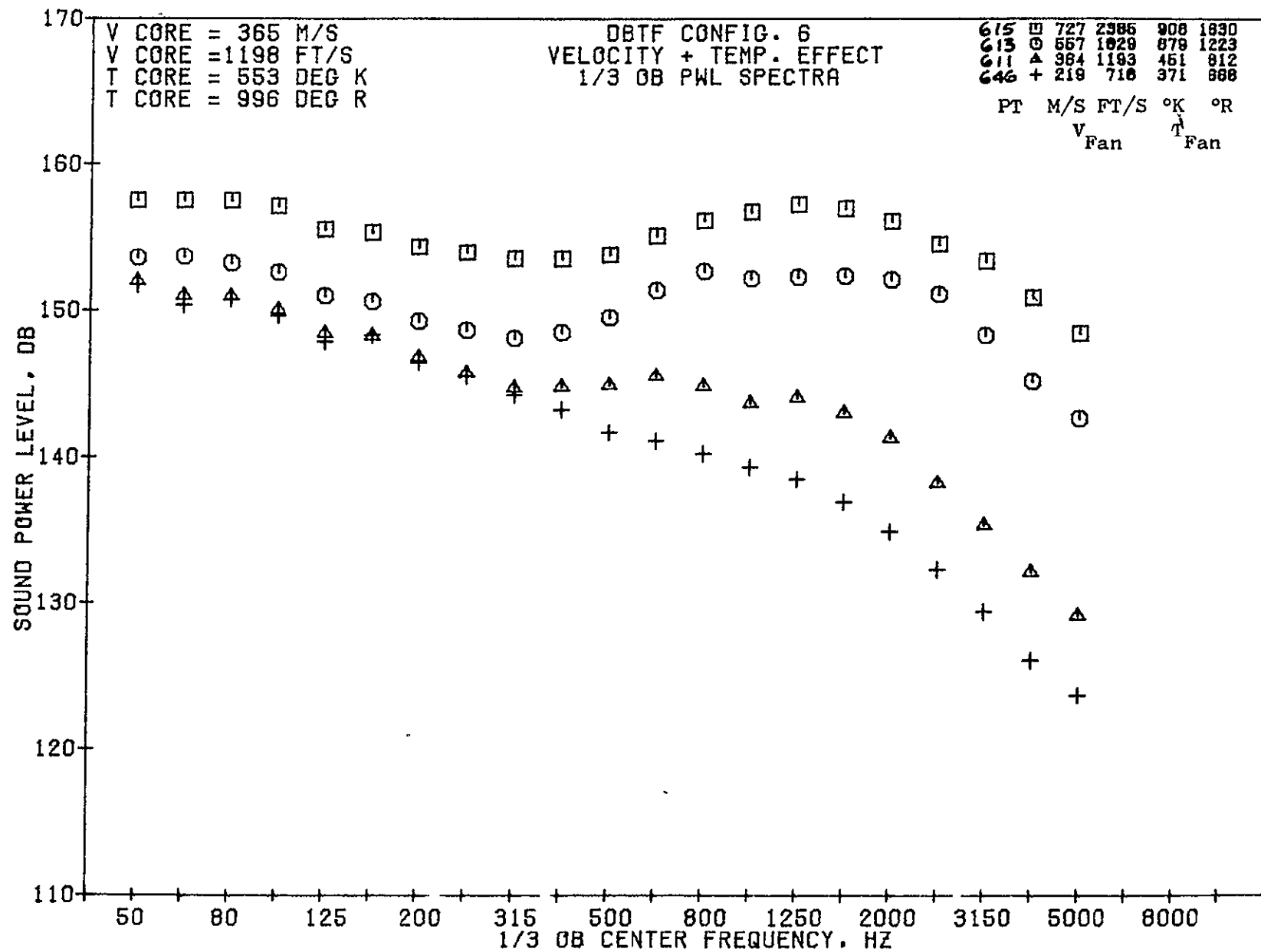
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5R921-001

79 BURCH A.



08/12/75
5R921-001

79 BURC

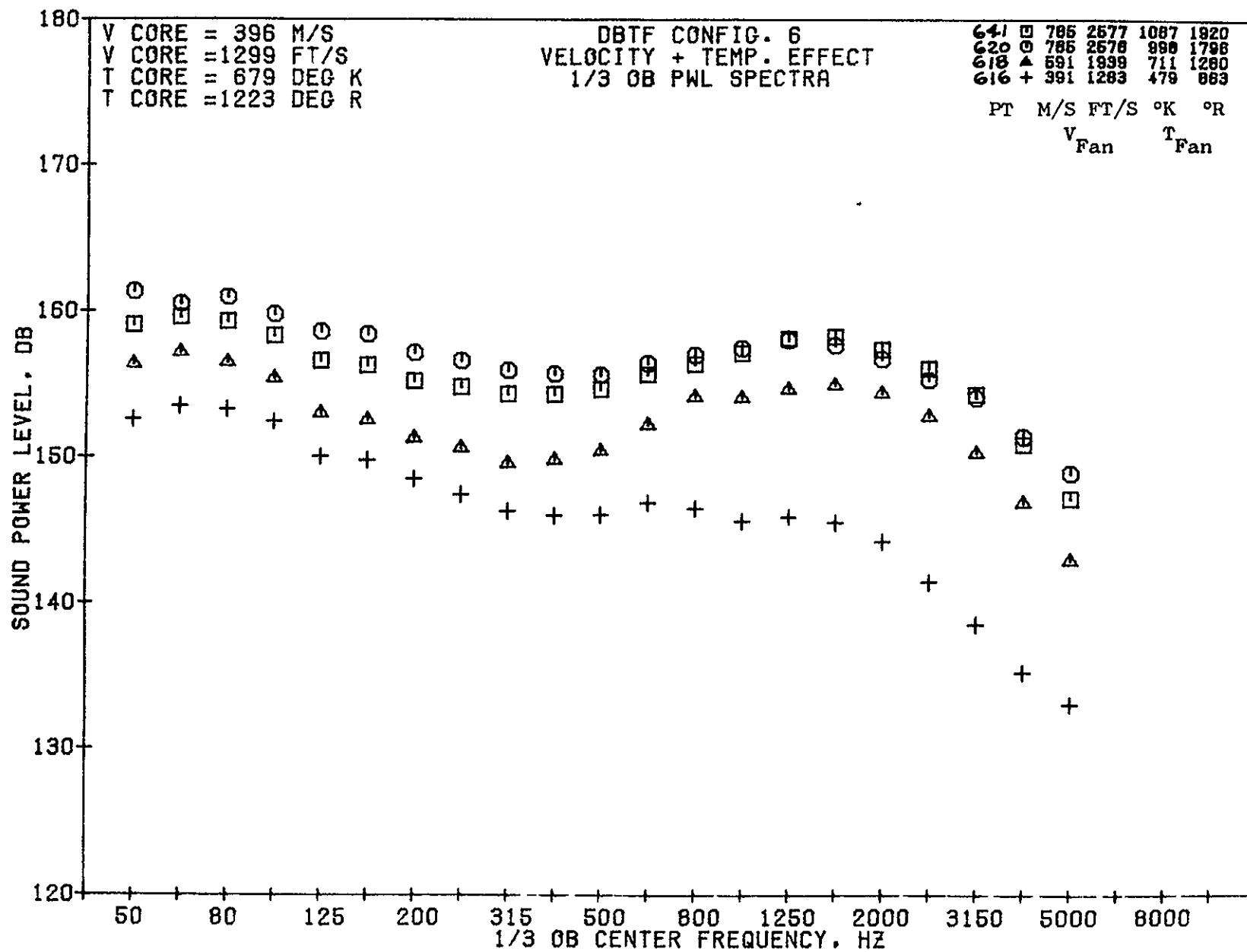


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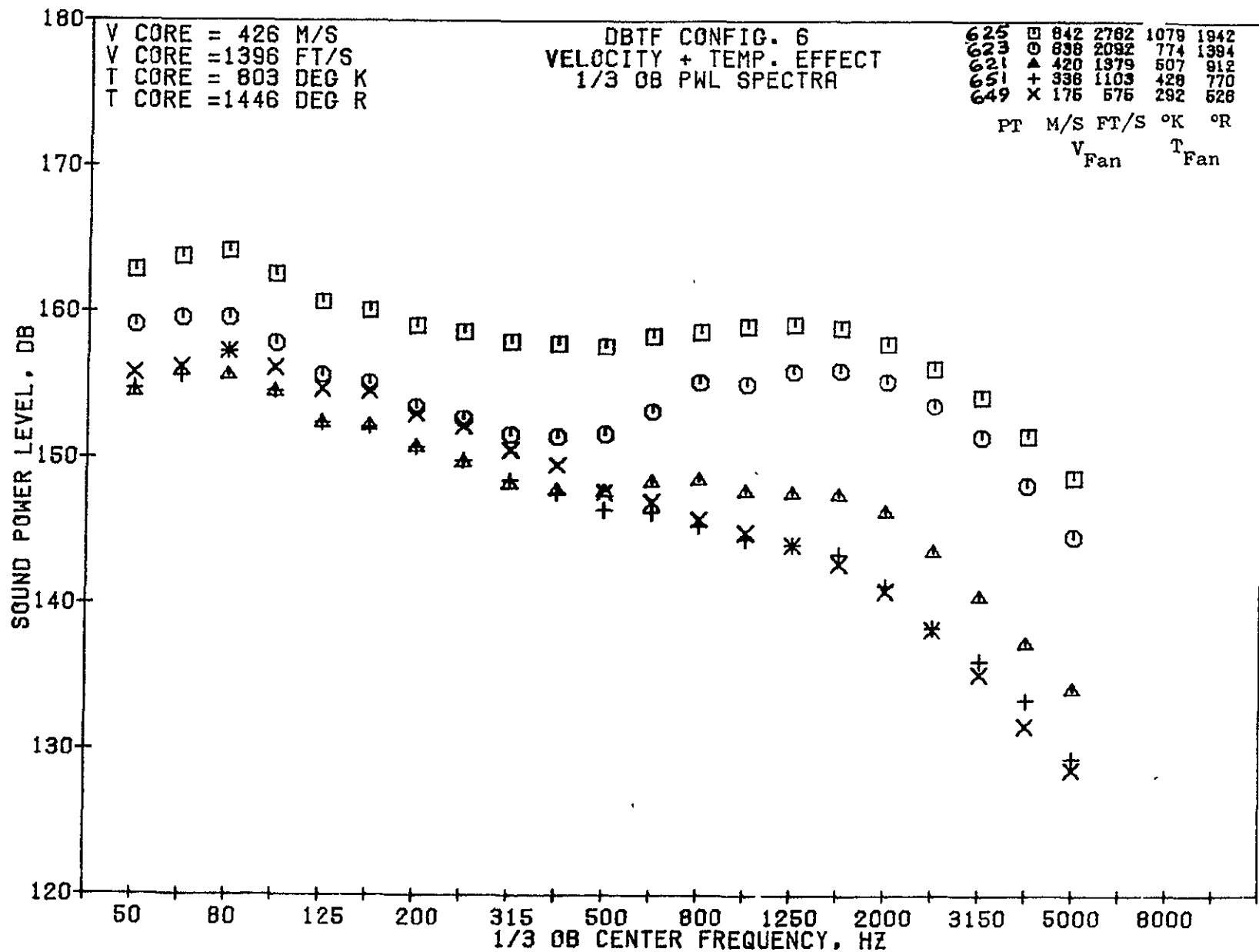
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1476



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79 BURCH A.



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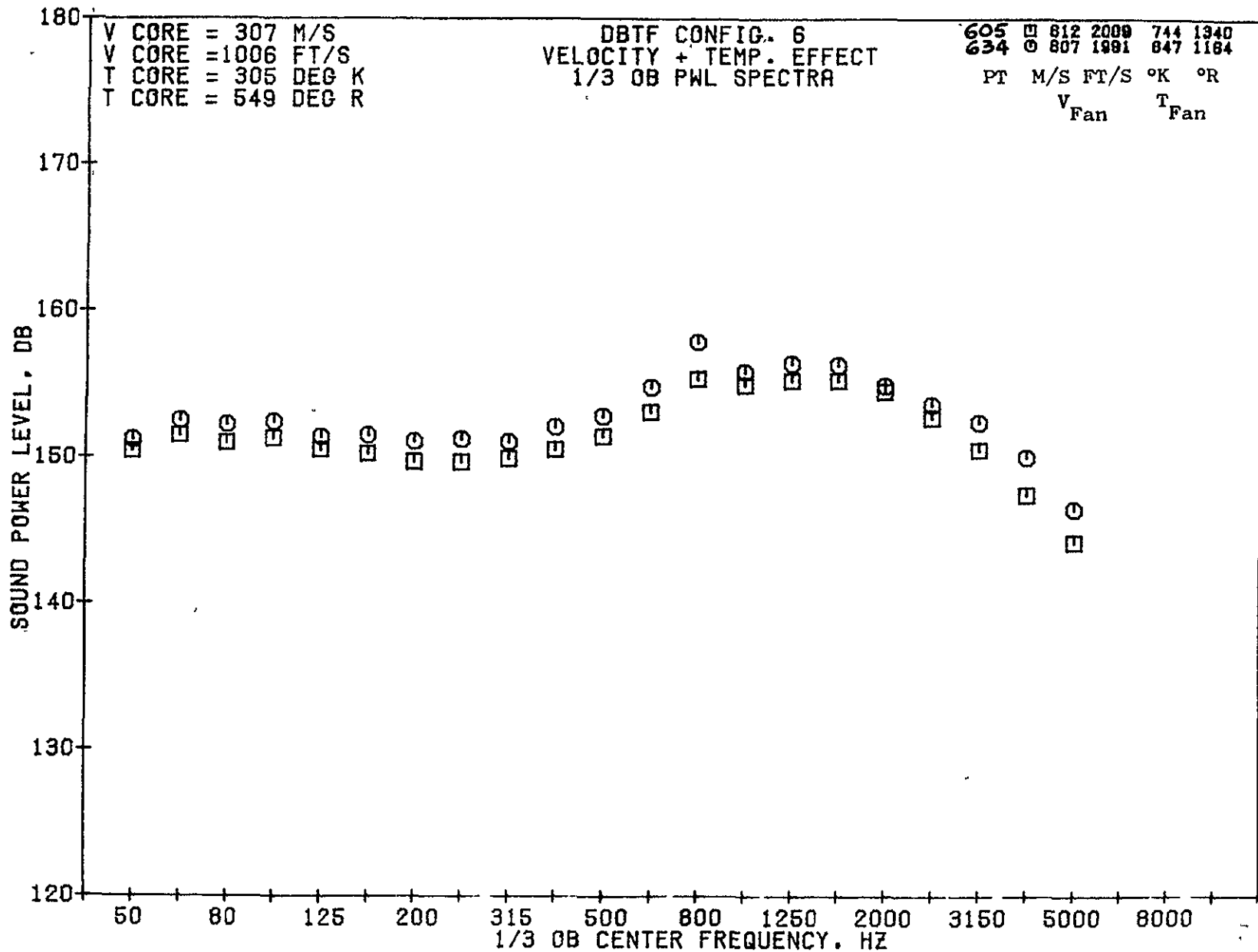
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79 BURCH A.

1477

11-242

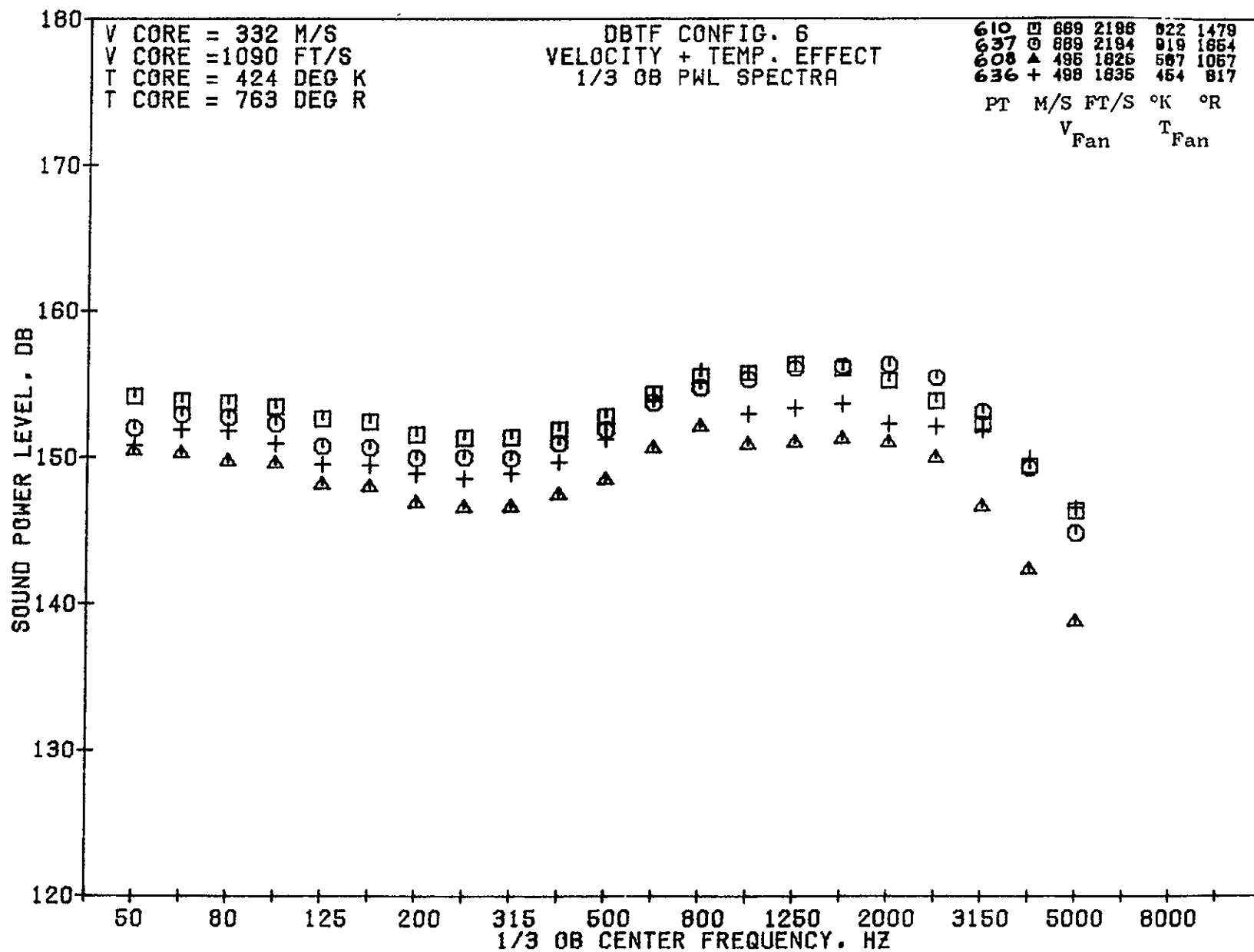
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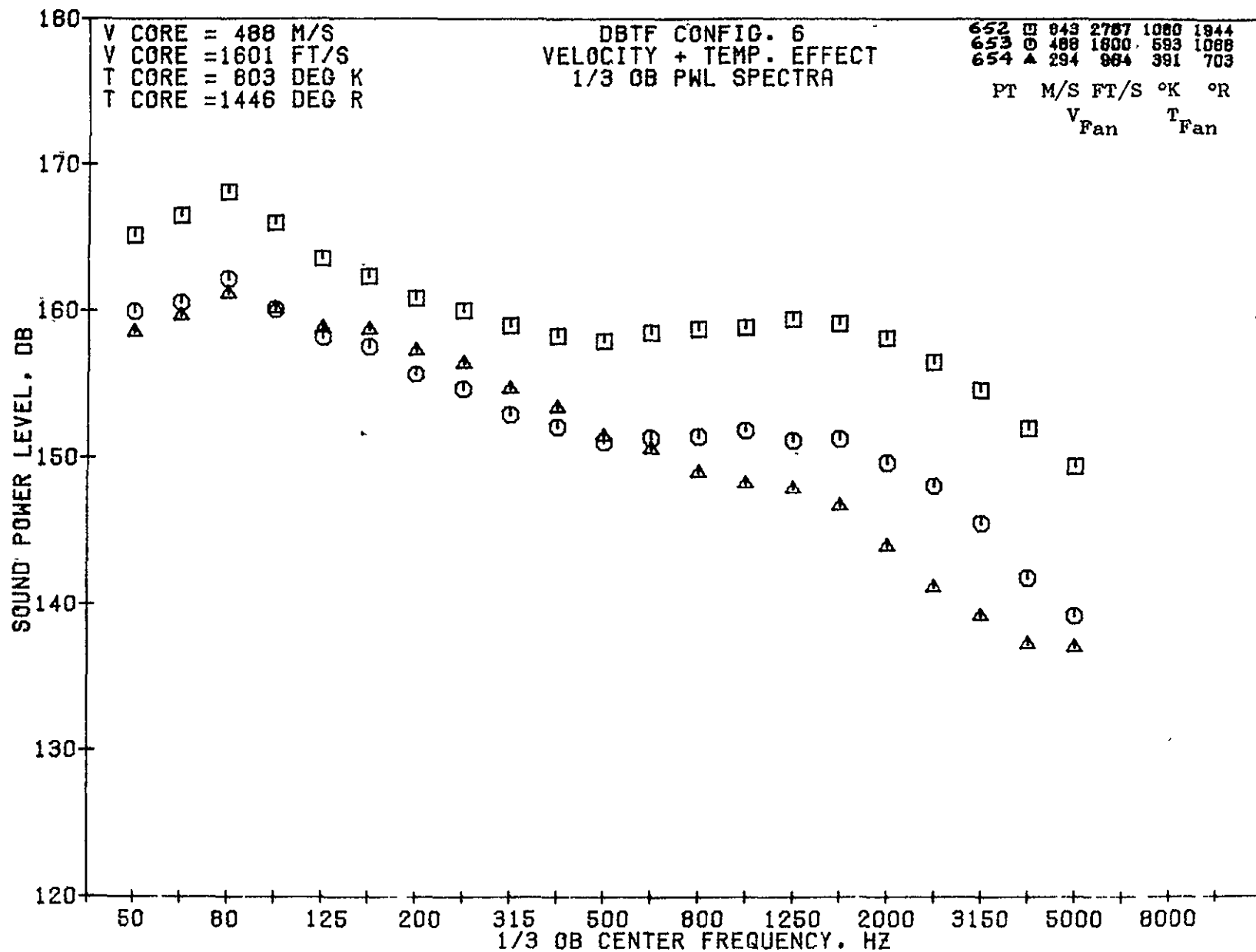
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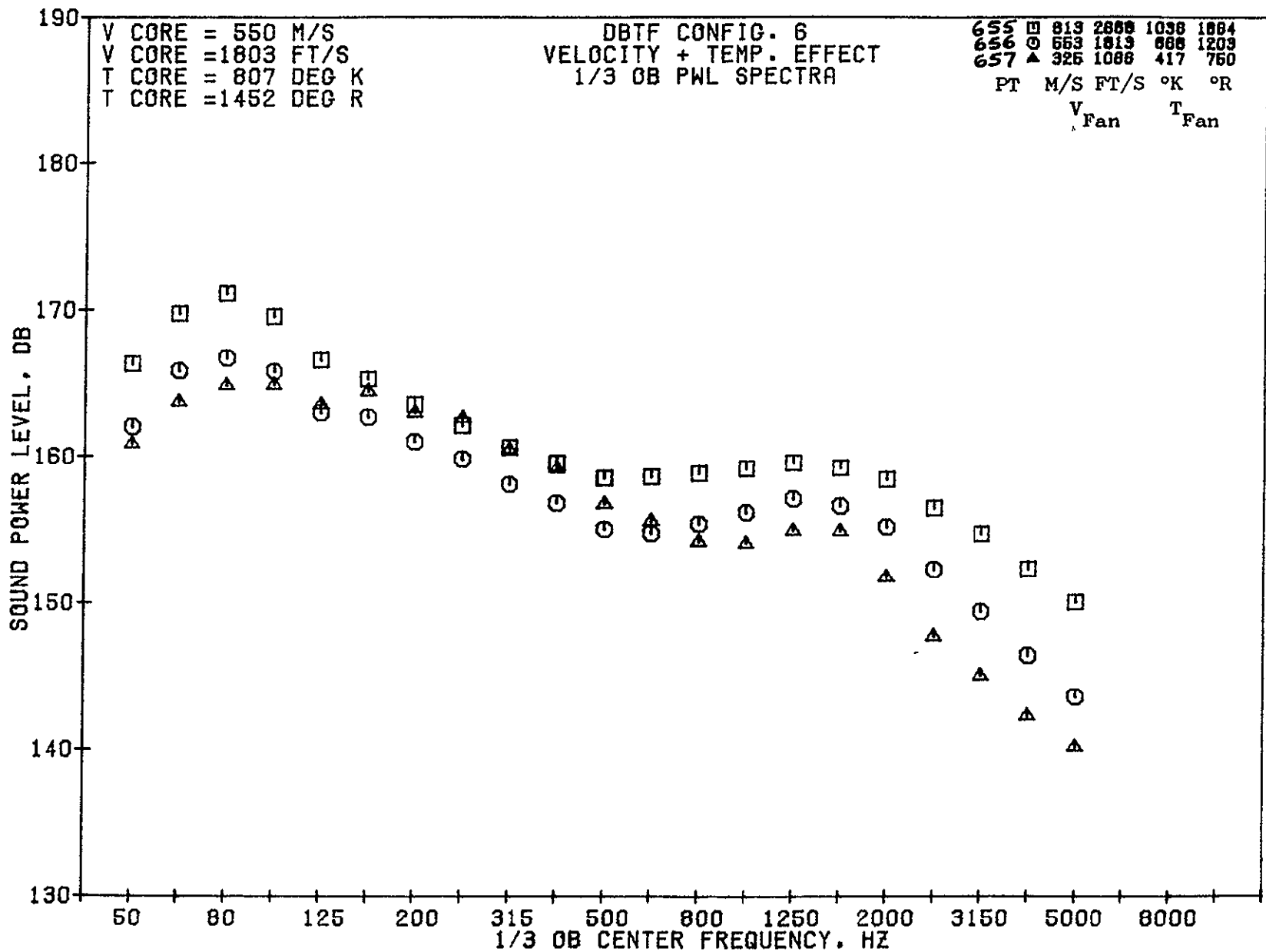
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79 BURCH A.



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79 BUR A.

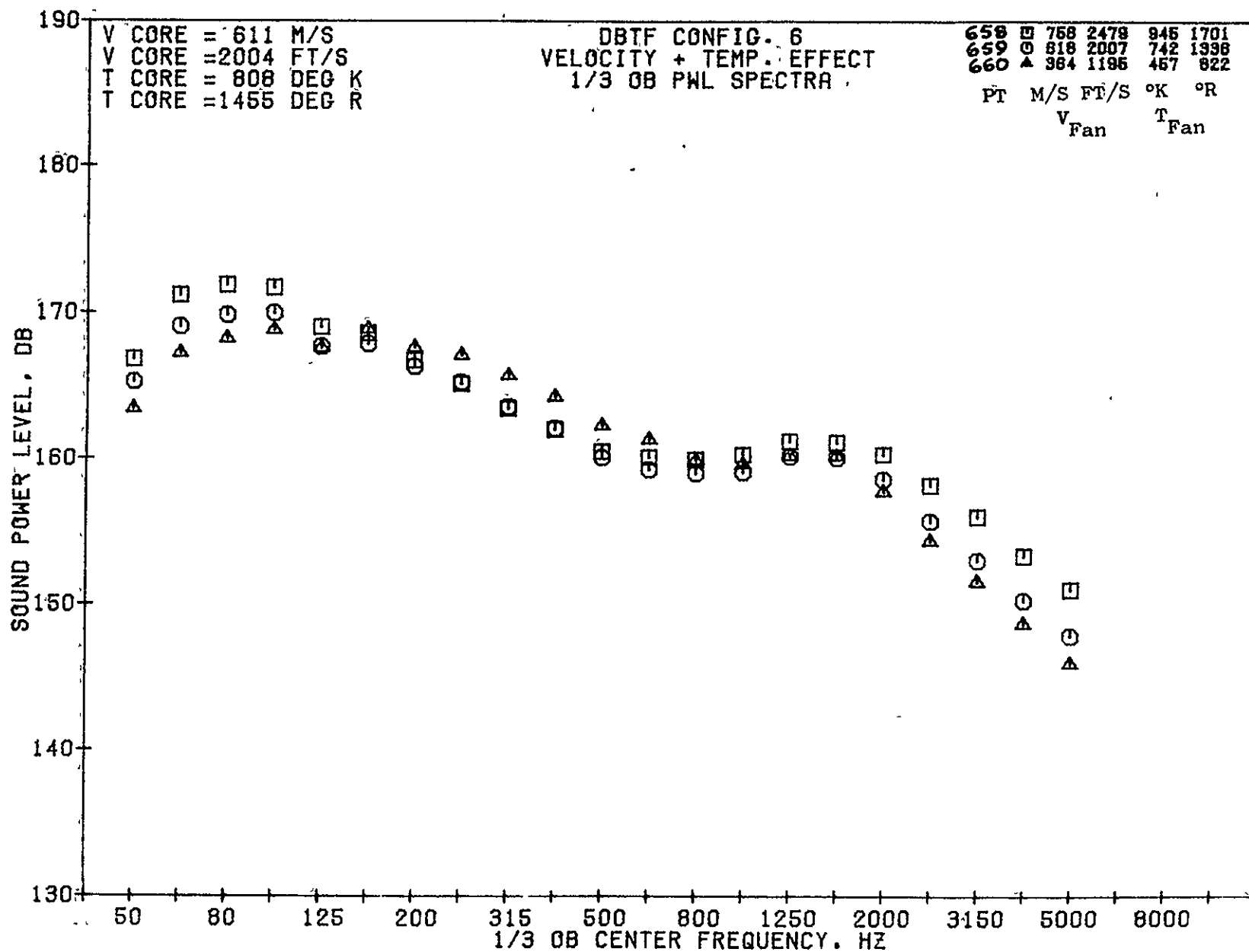


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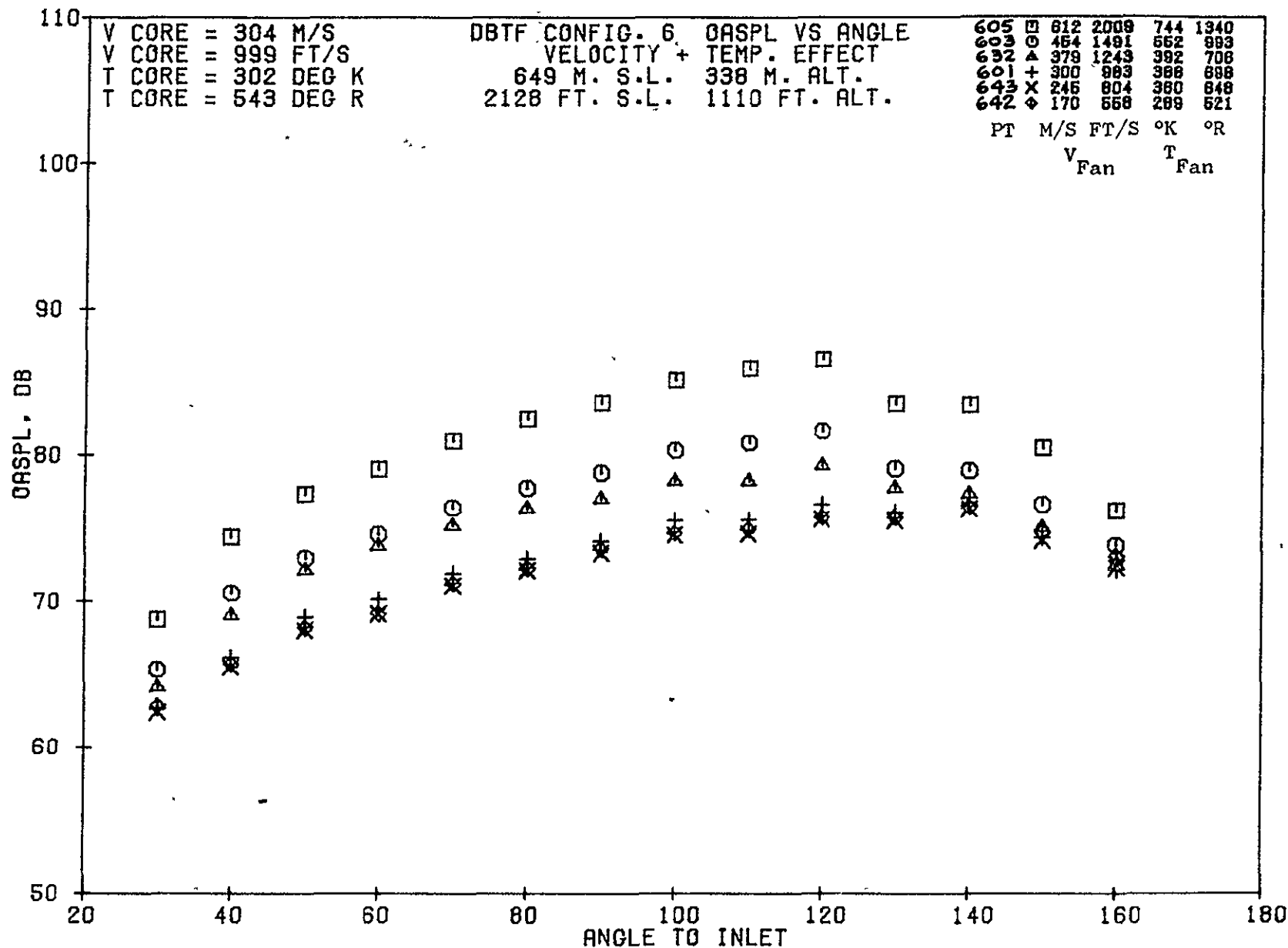
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79 BUR A.

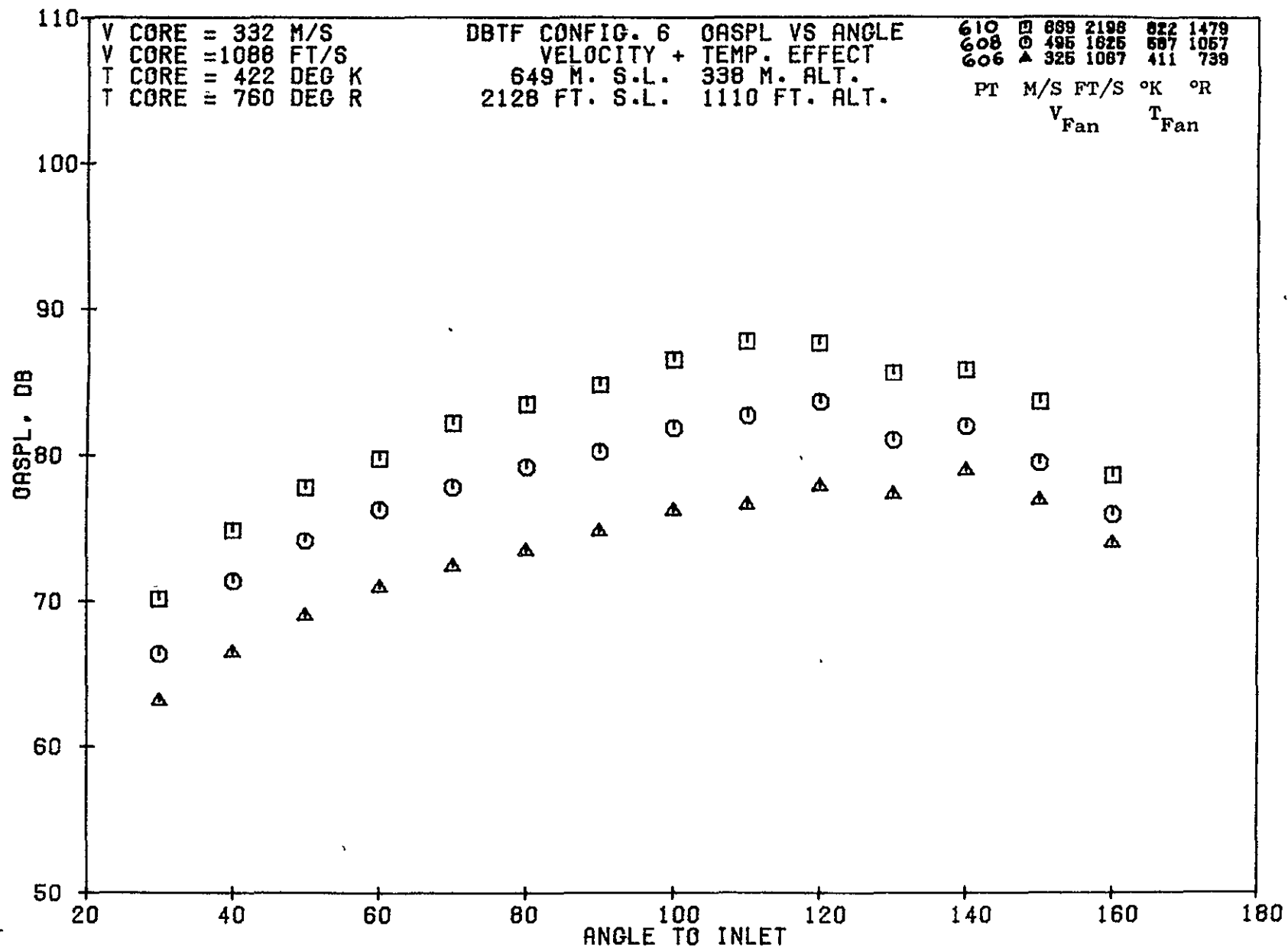


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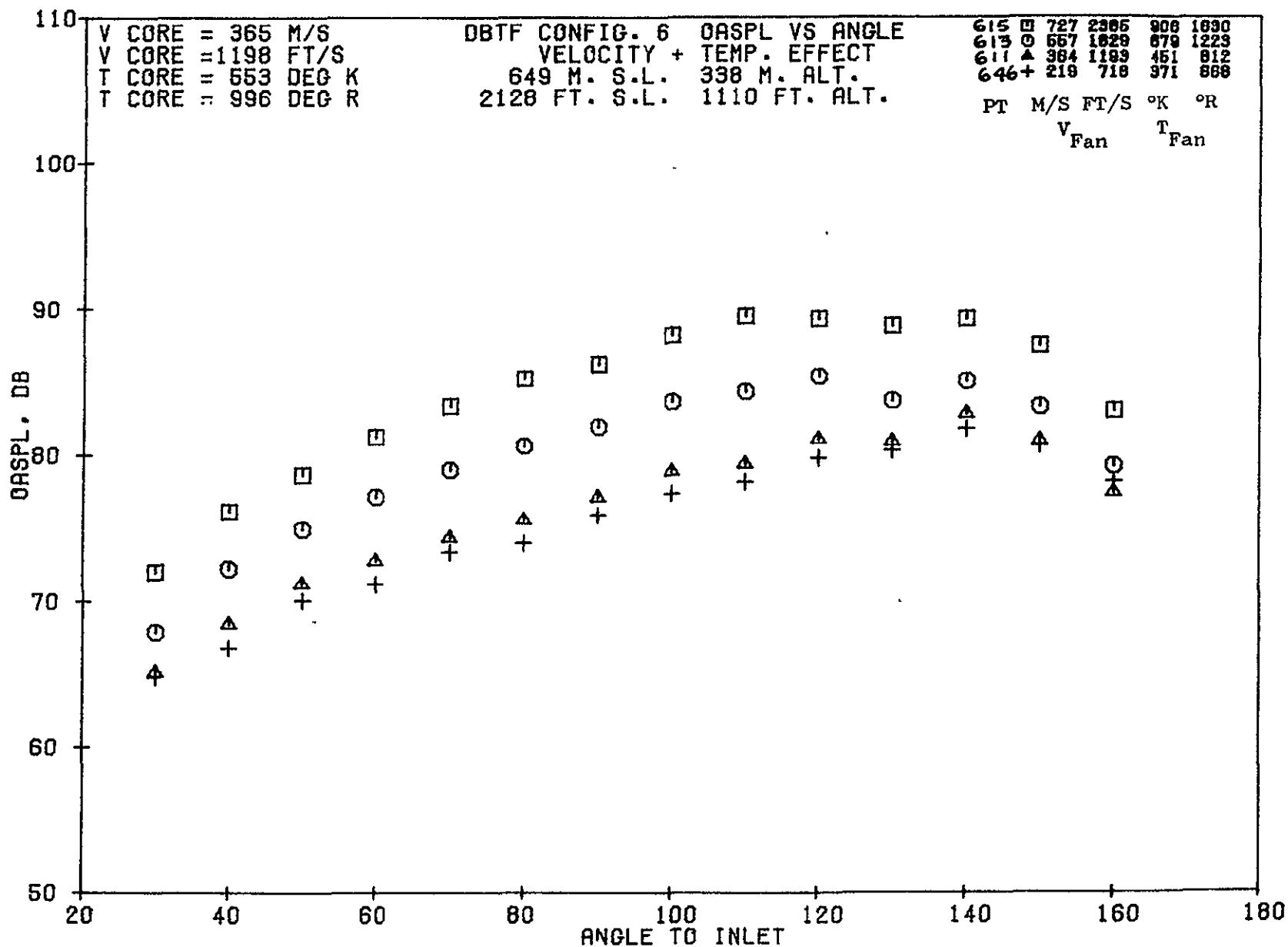
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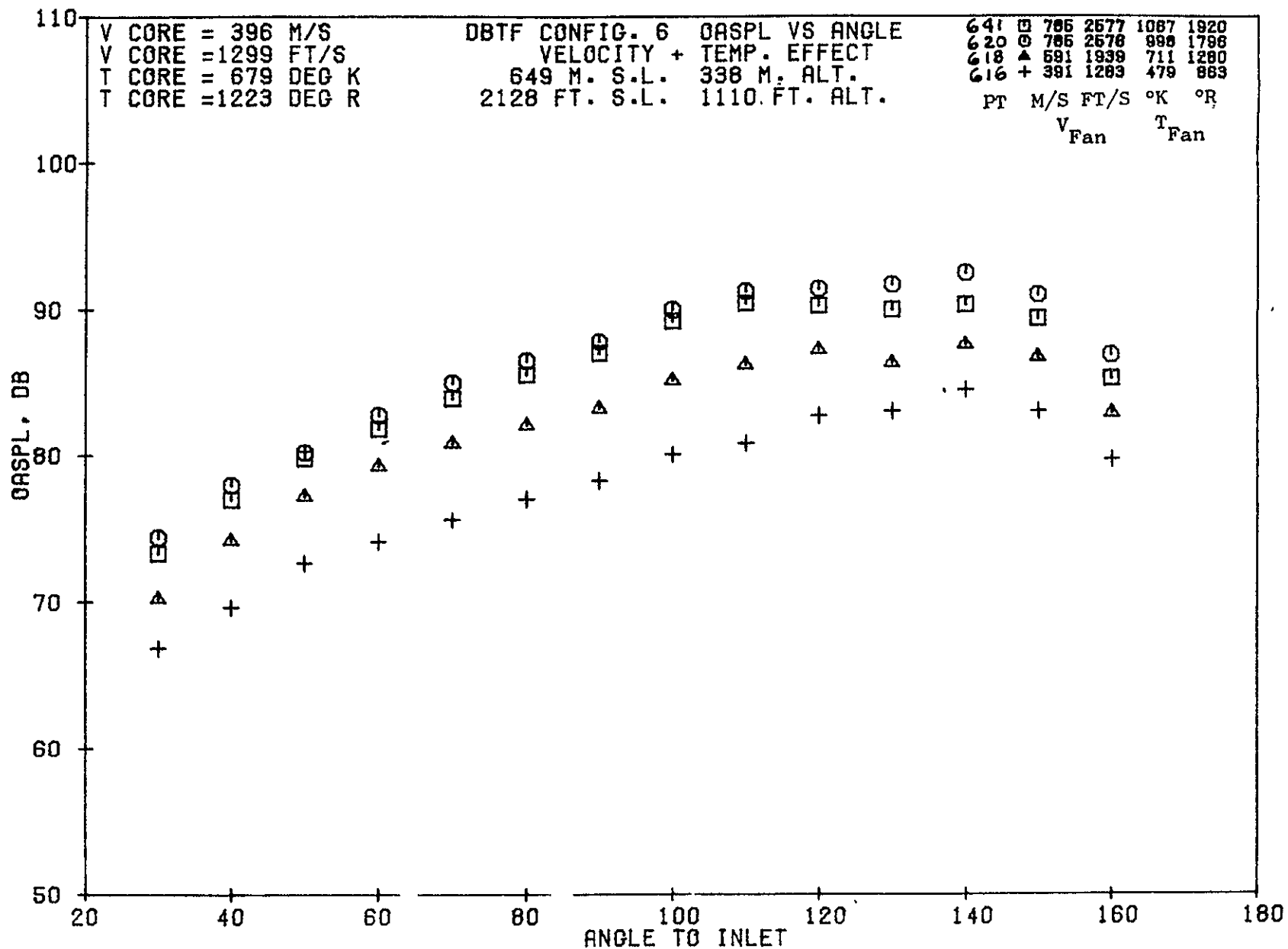
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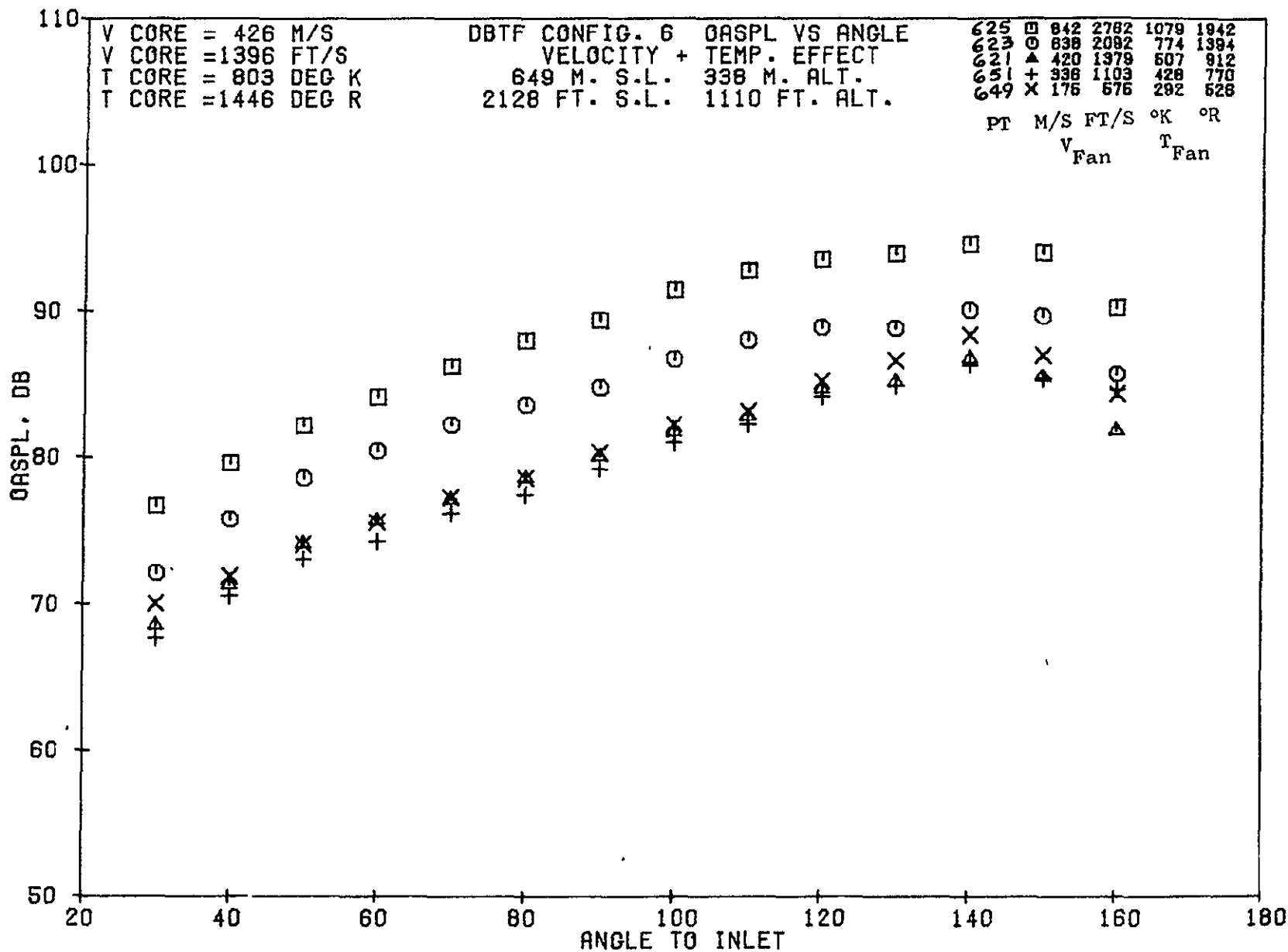
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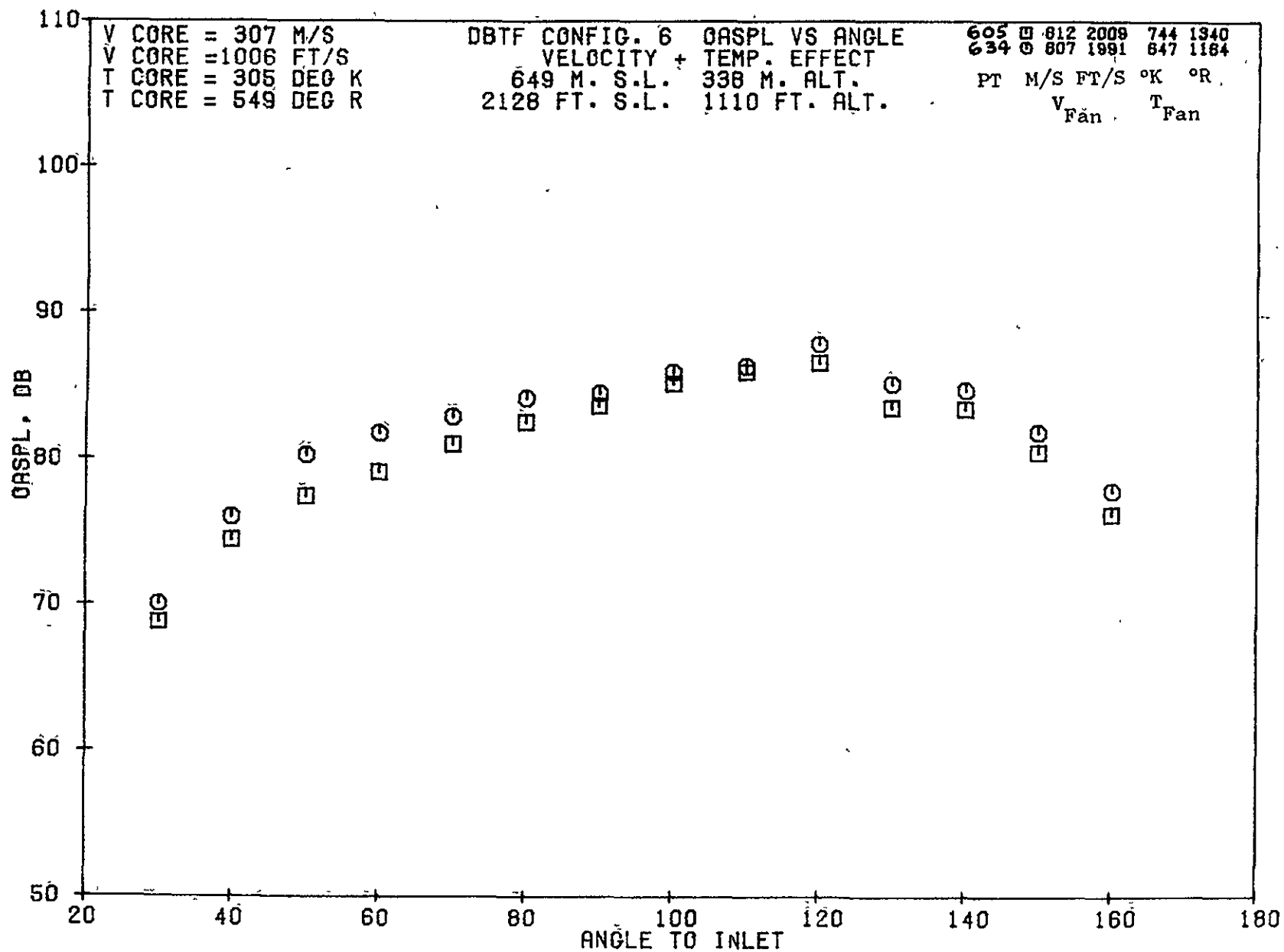
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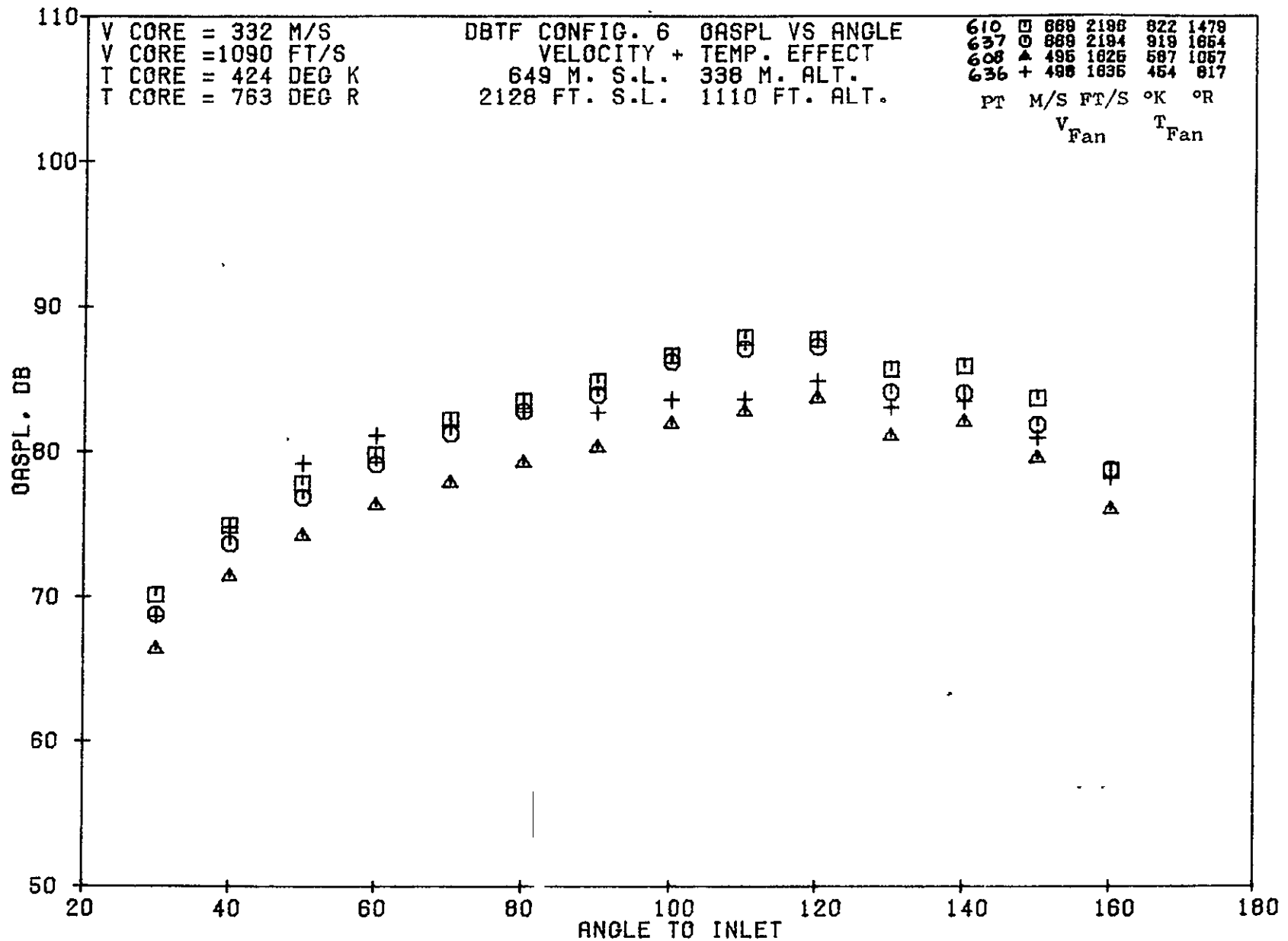
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79 BURC

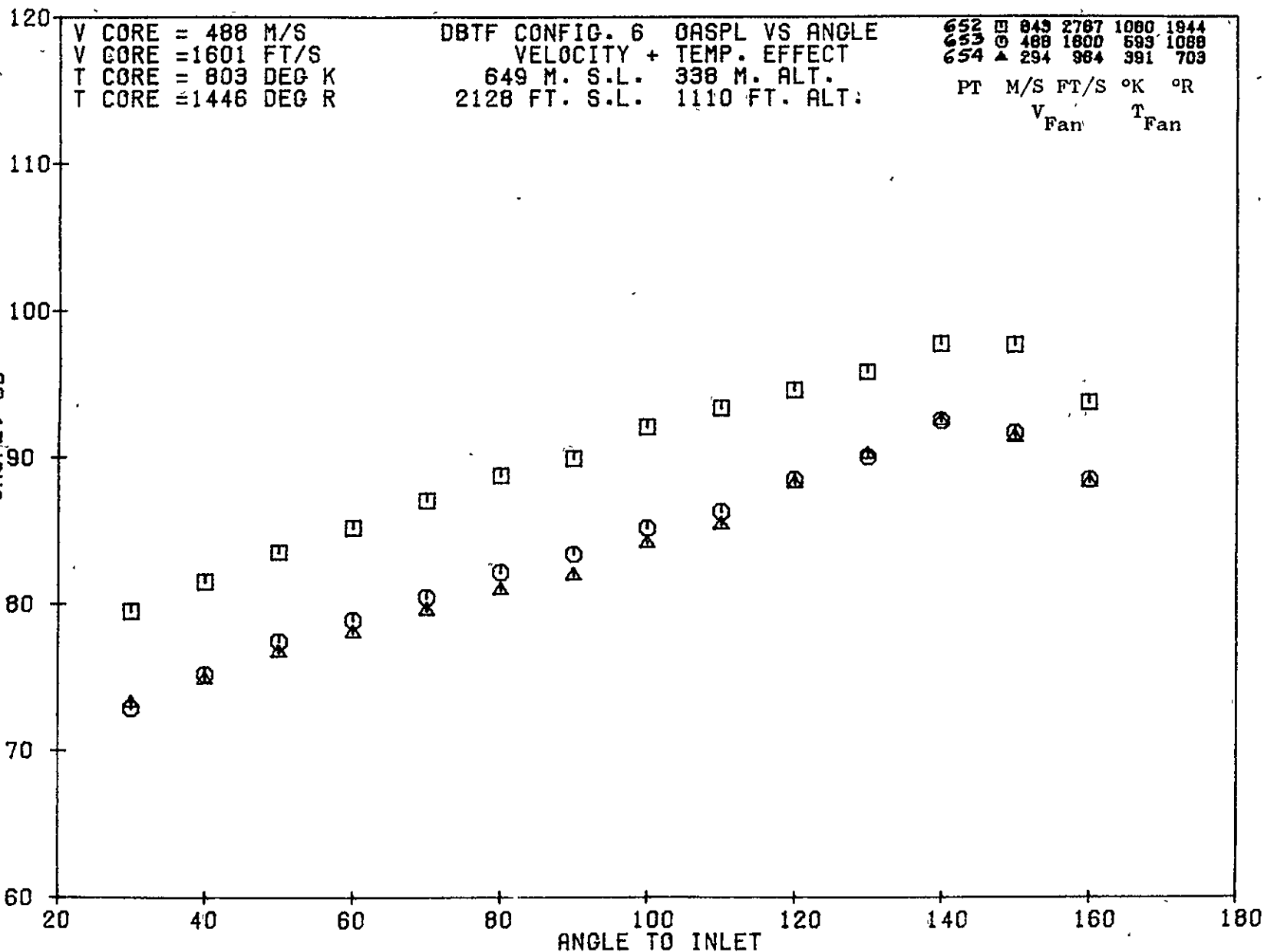


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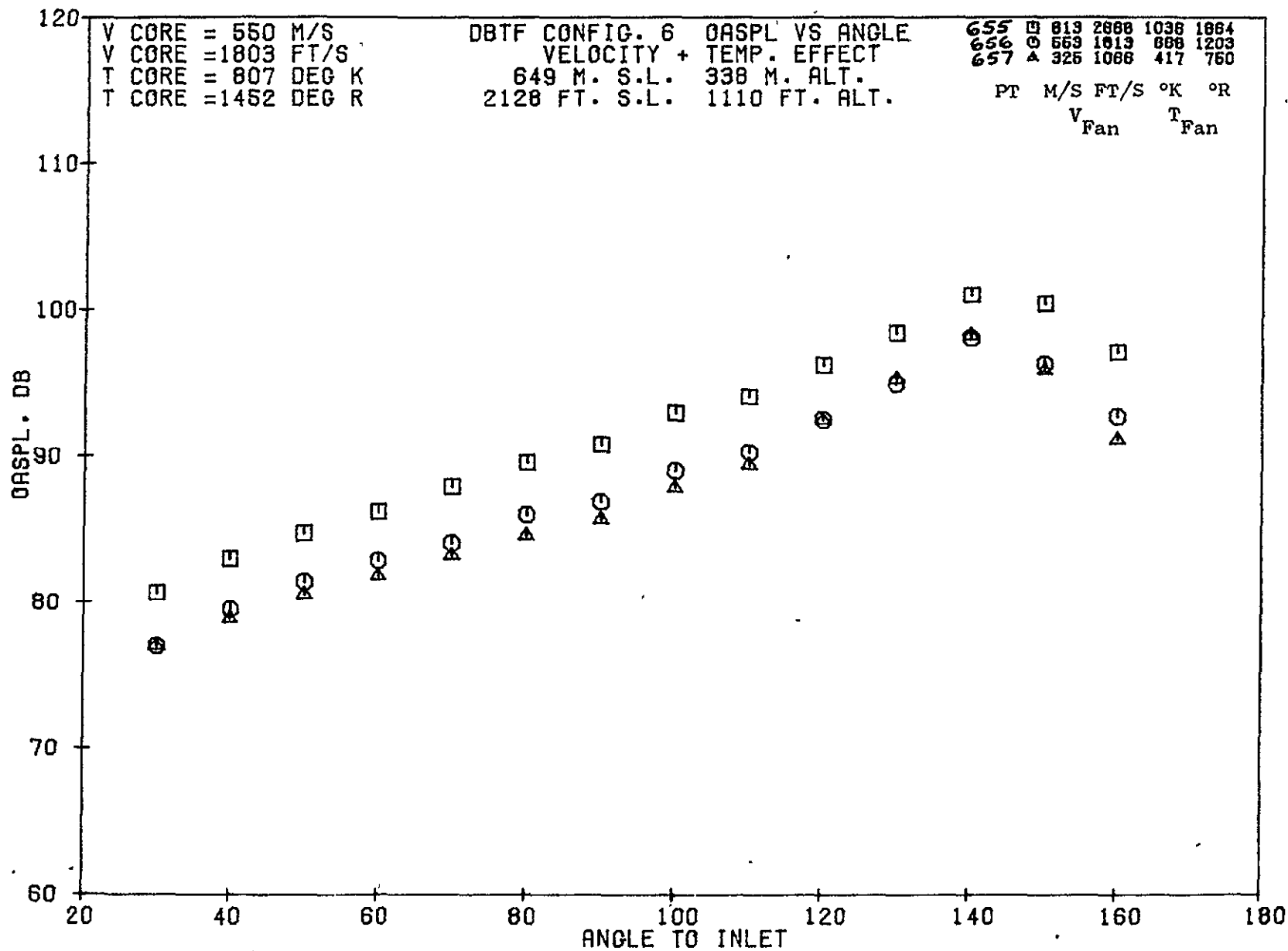
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79 BURC A.

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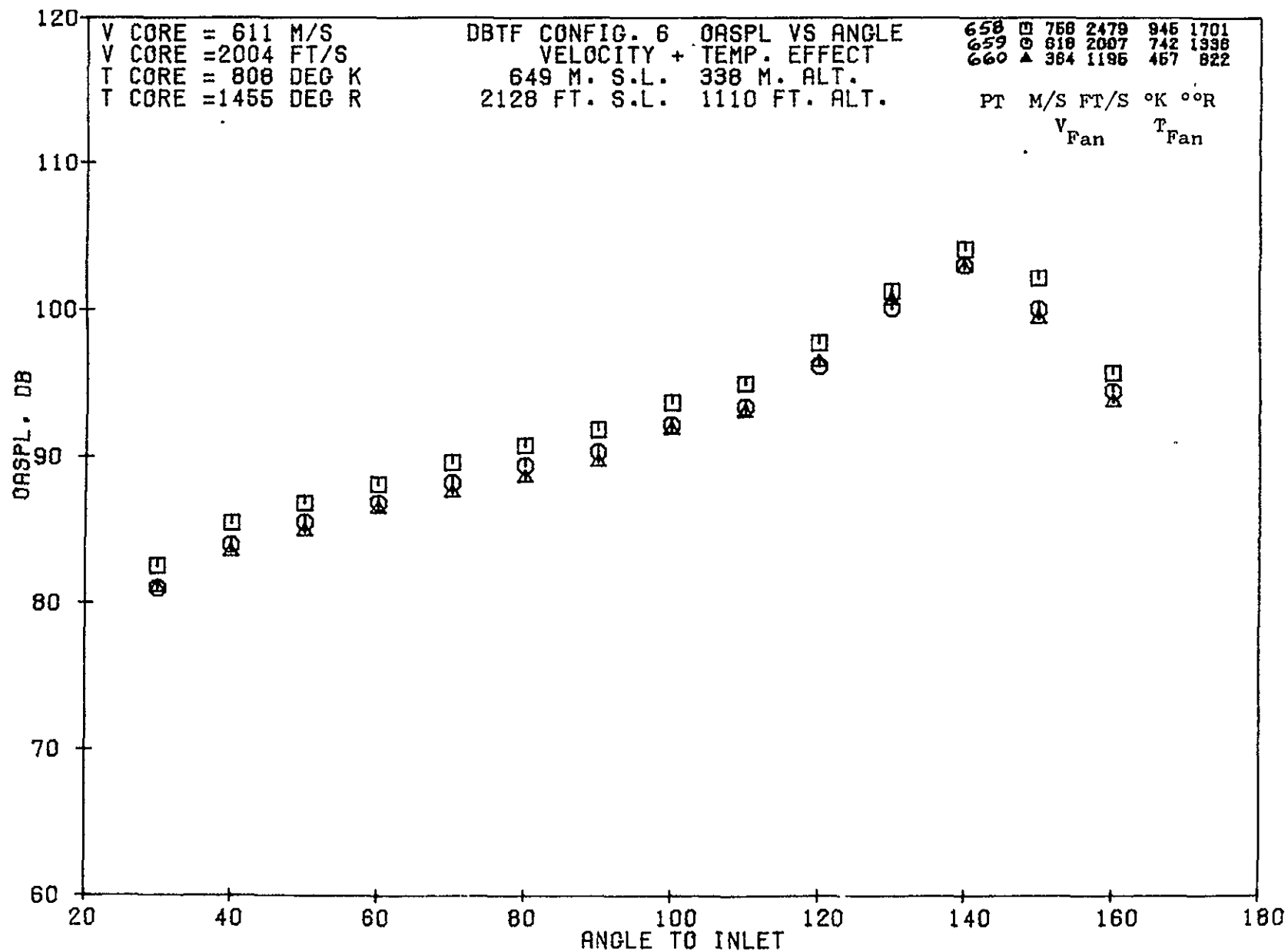


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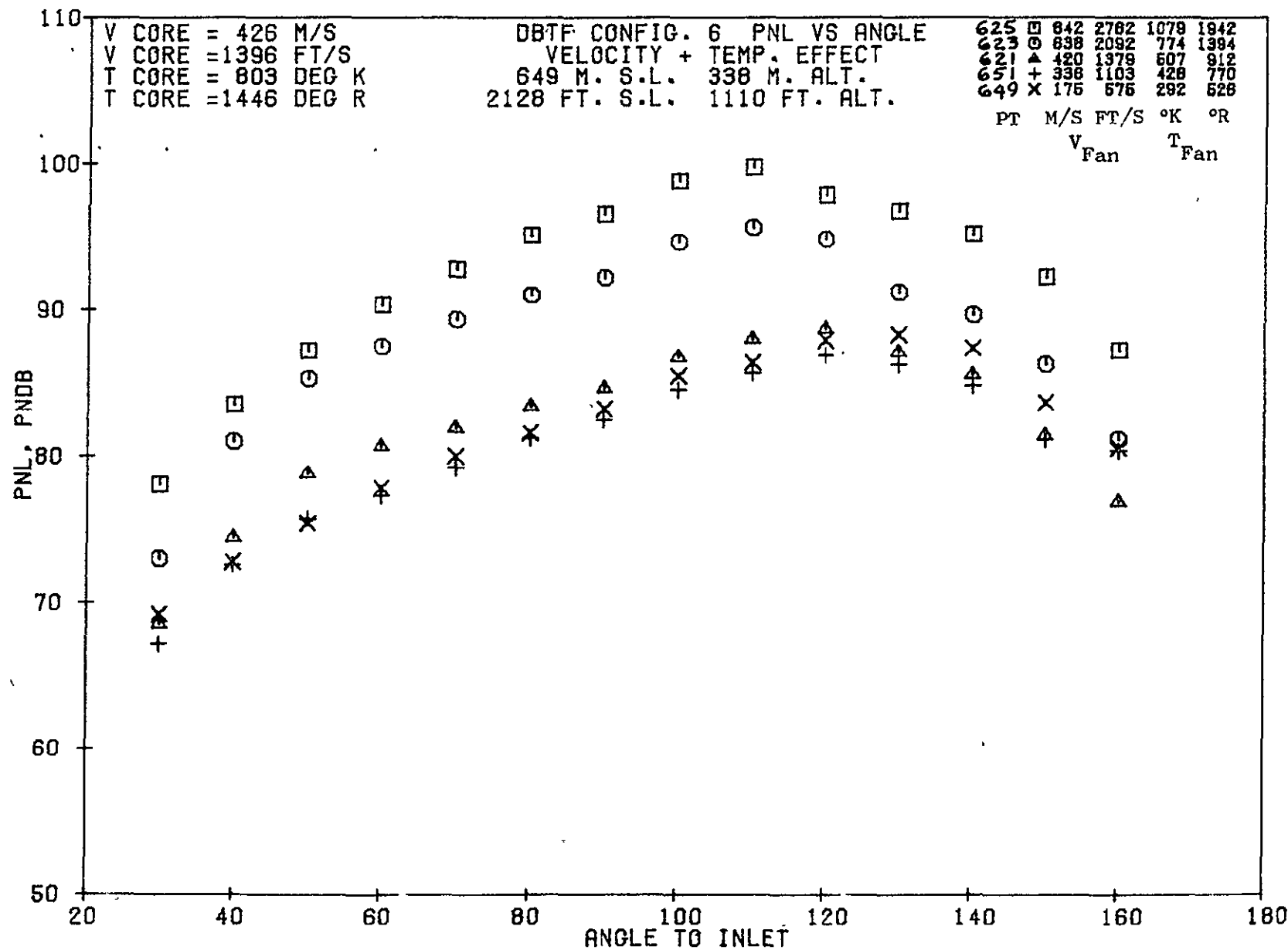
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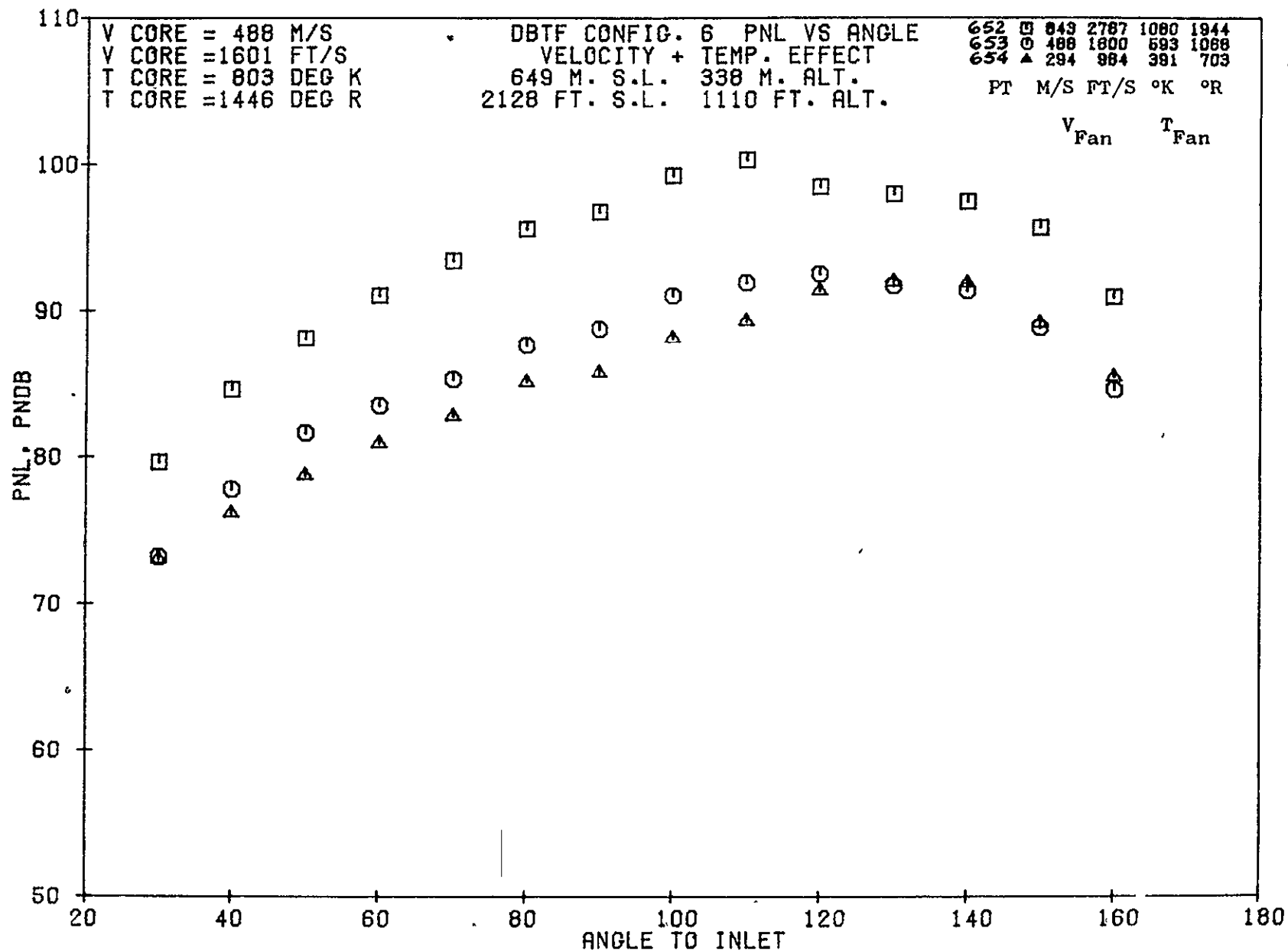
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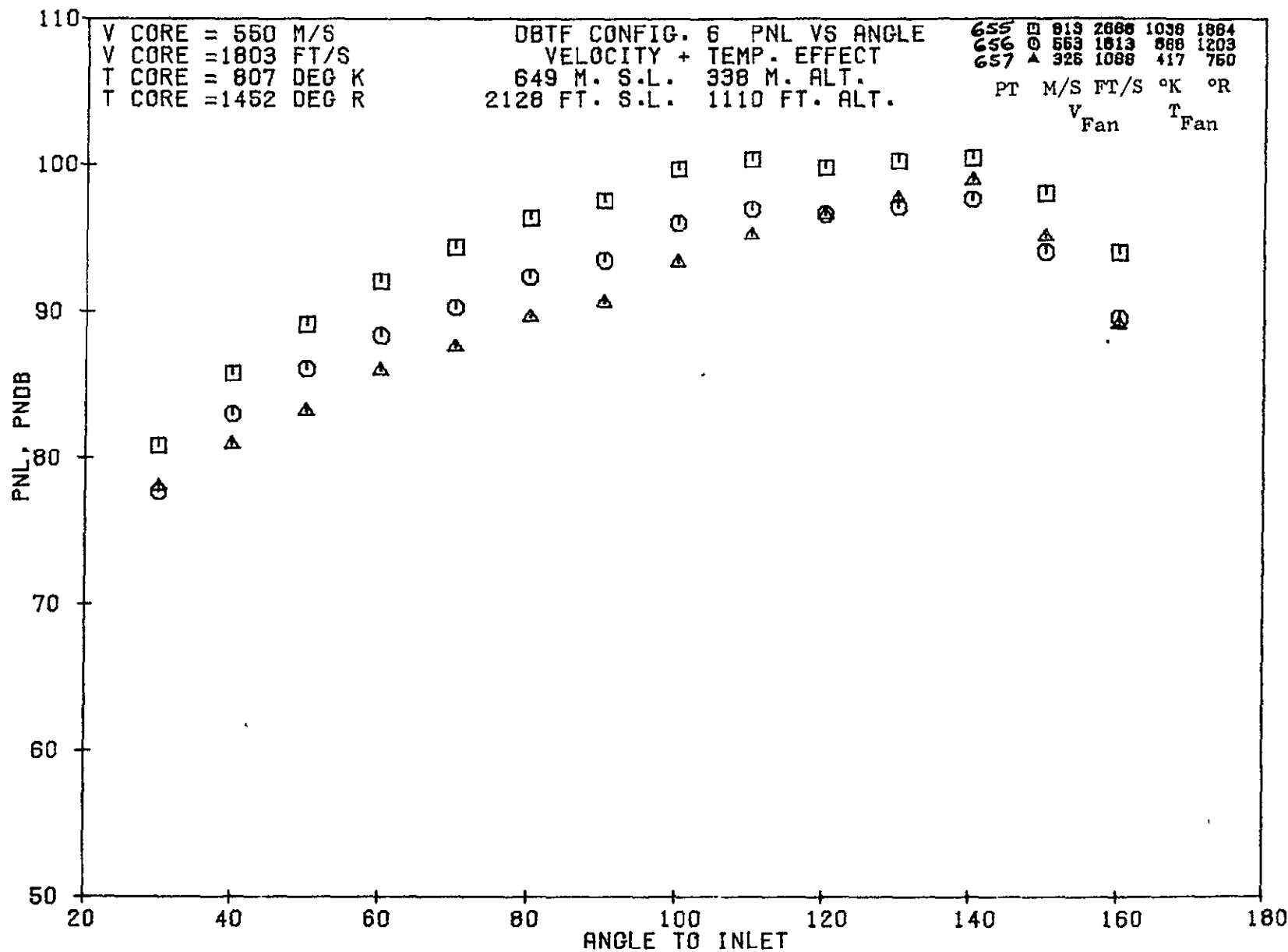
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79 BURCH A.



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79 BURC

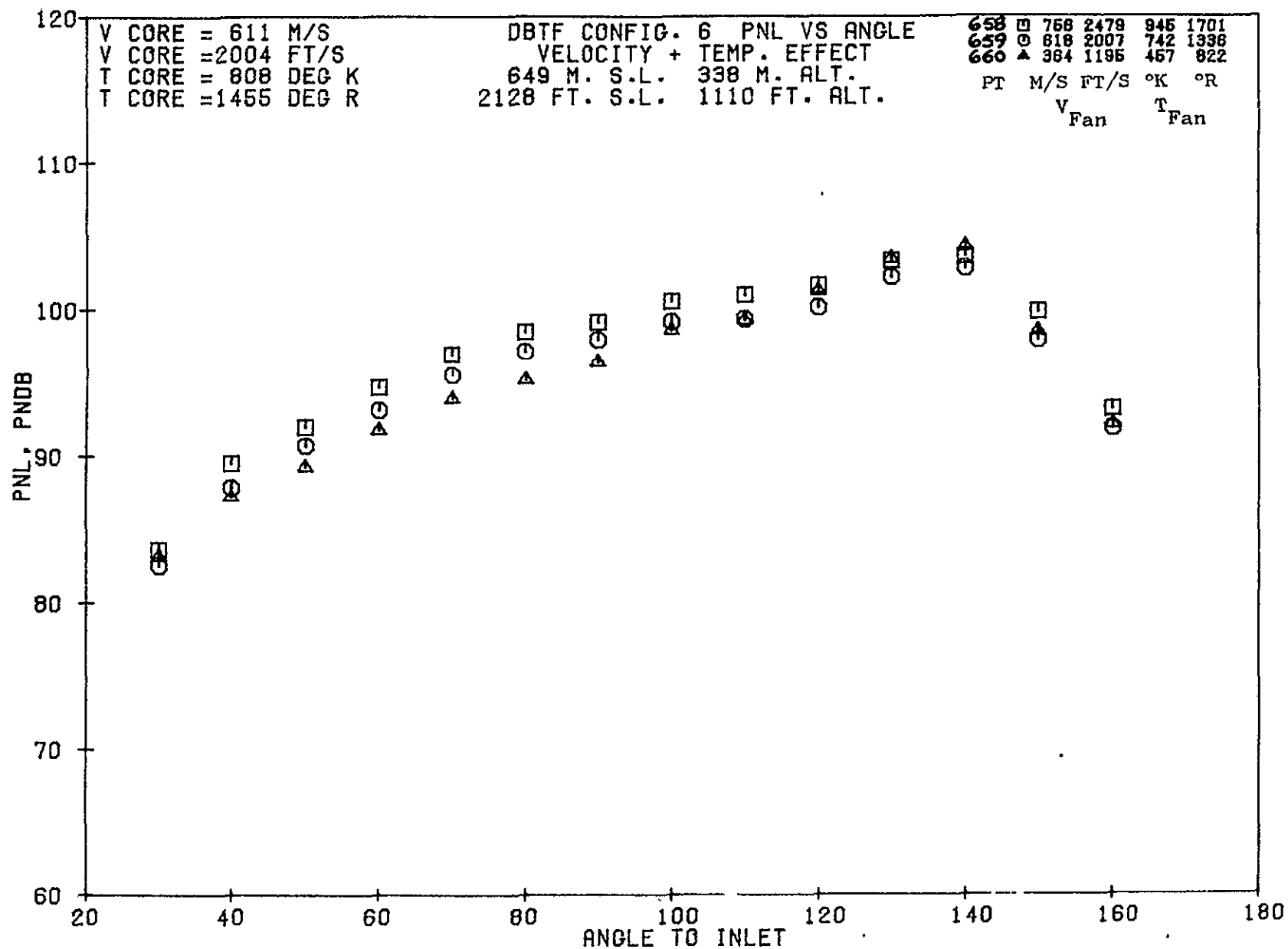


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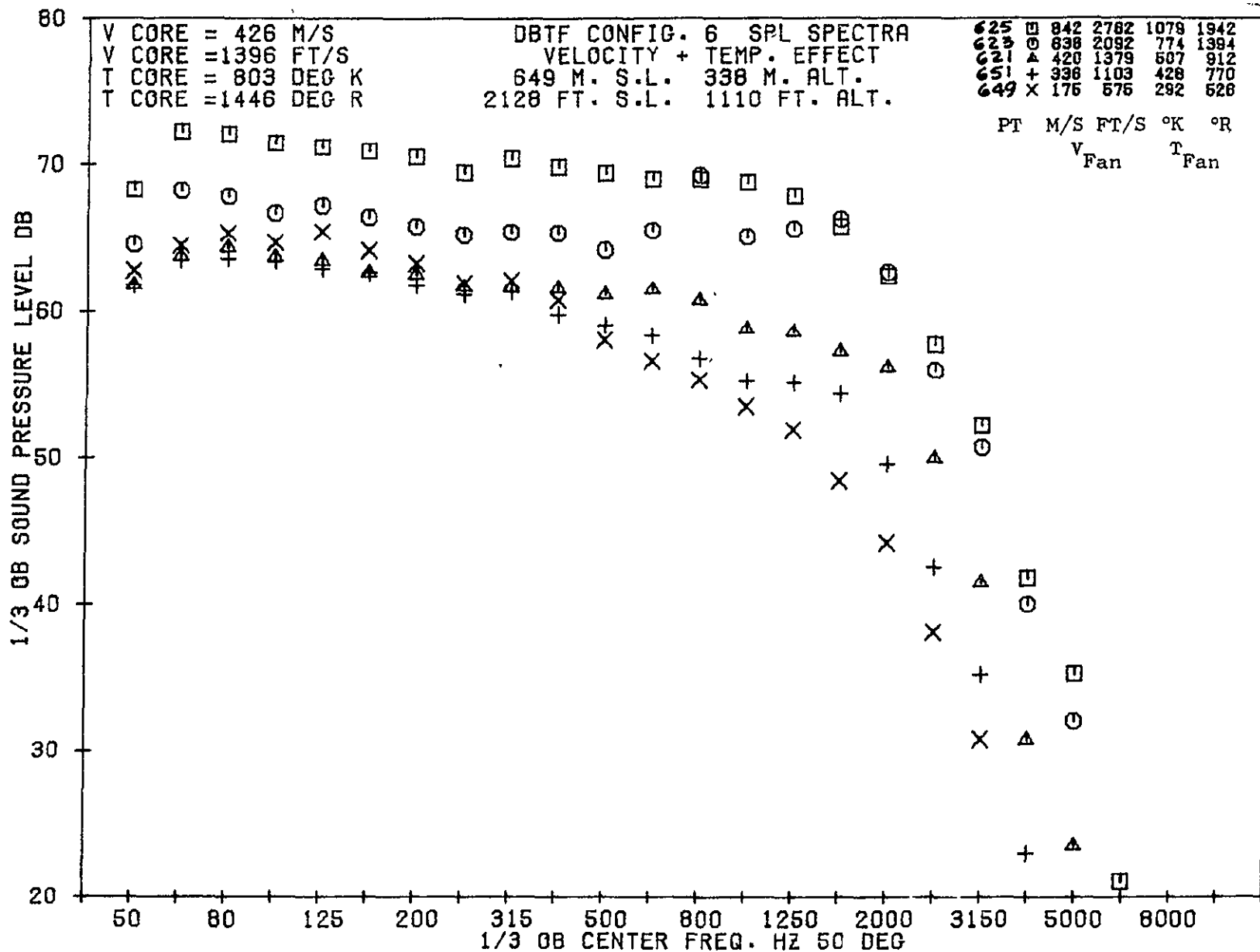
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79 BURCH A.



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5R921-001

79 BURCH A.



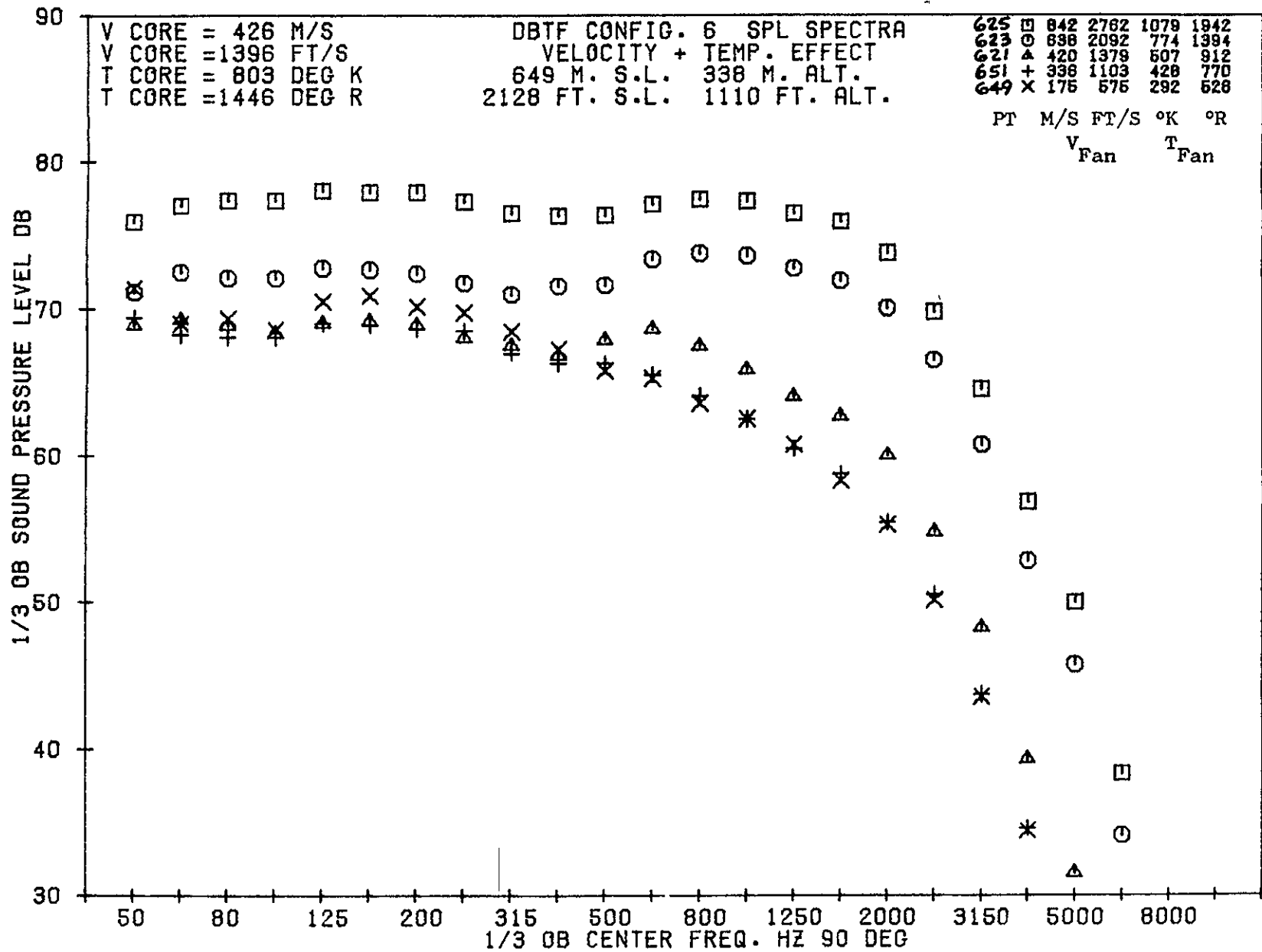
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79 BURCH A.

4-262

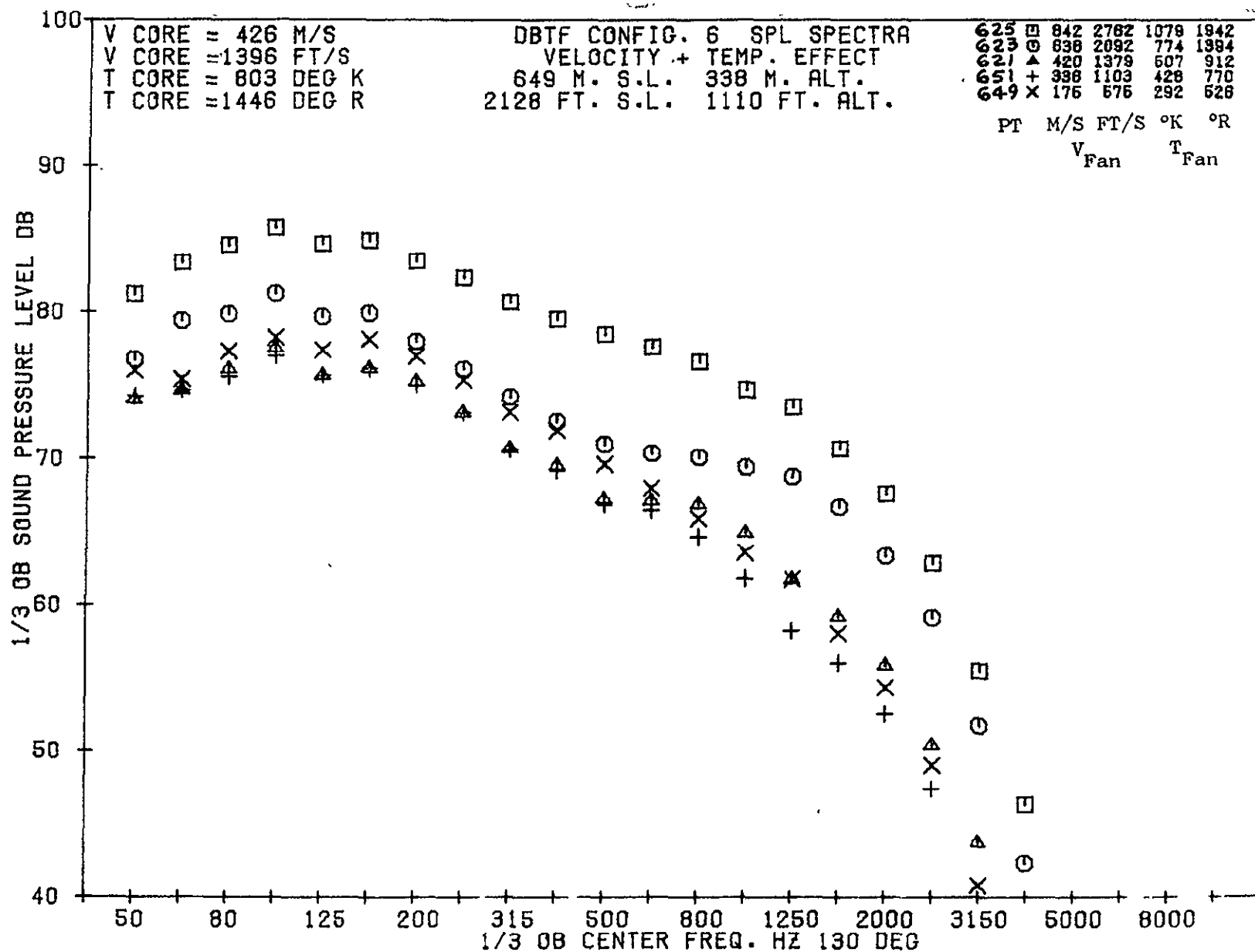
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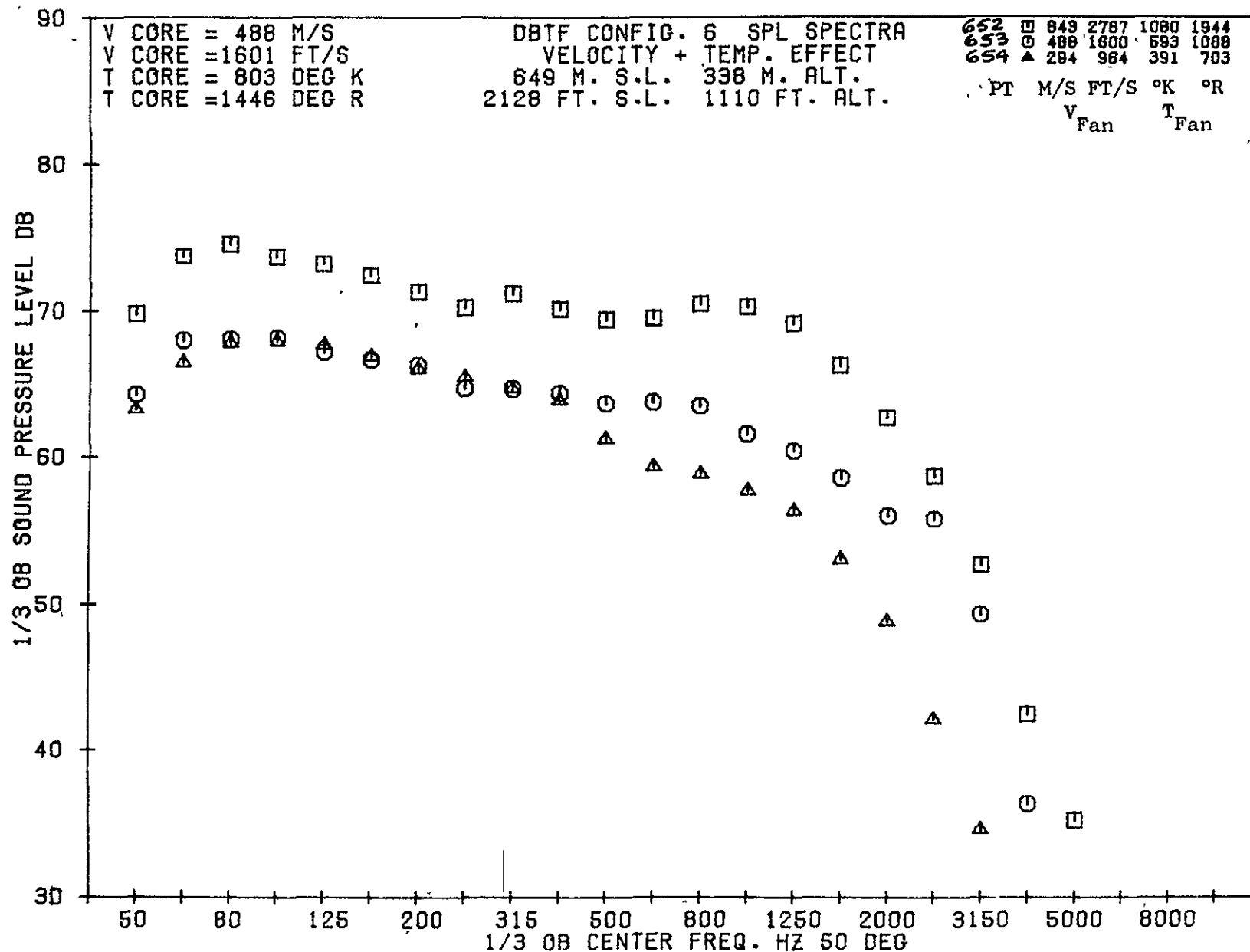
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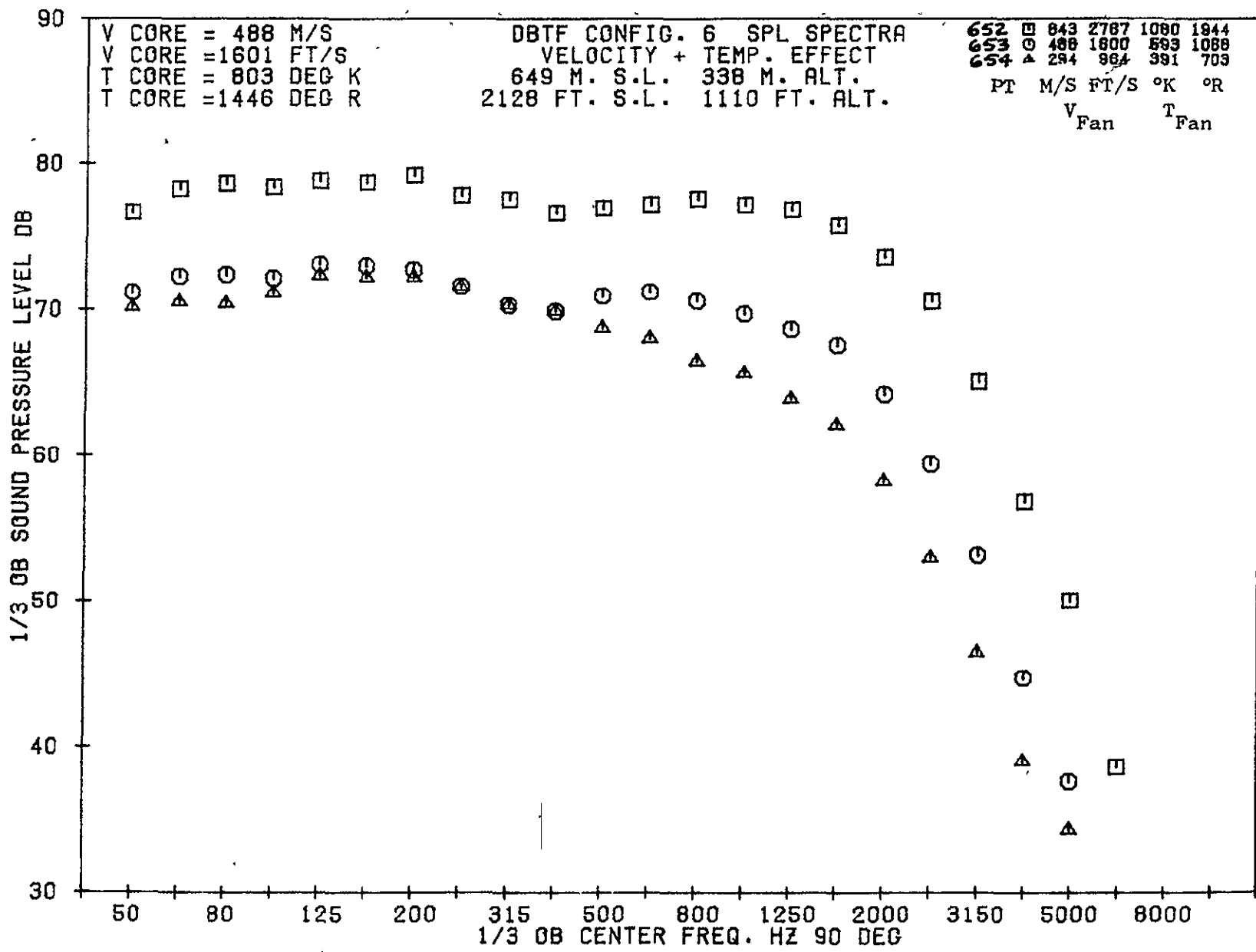
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79 BURCH A.



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79 BURCH A.

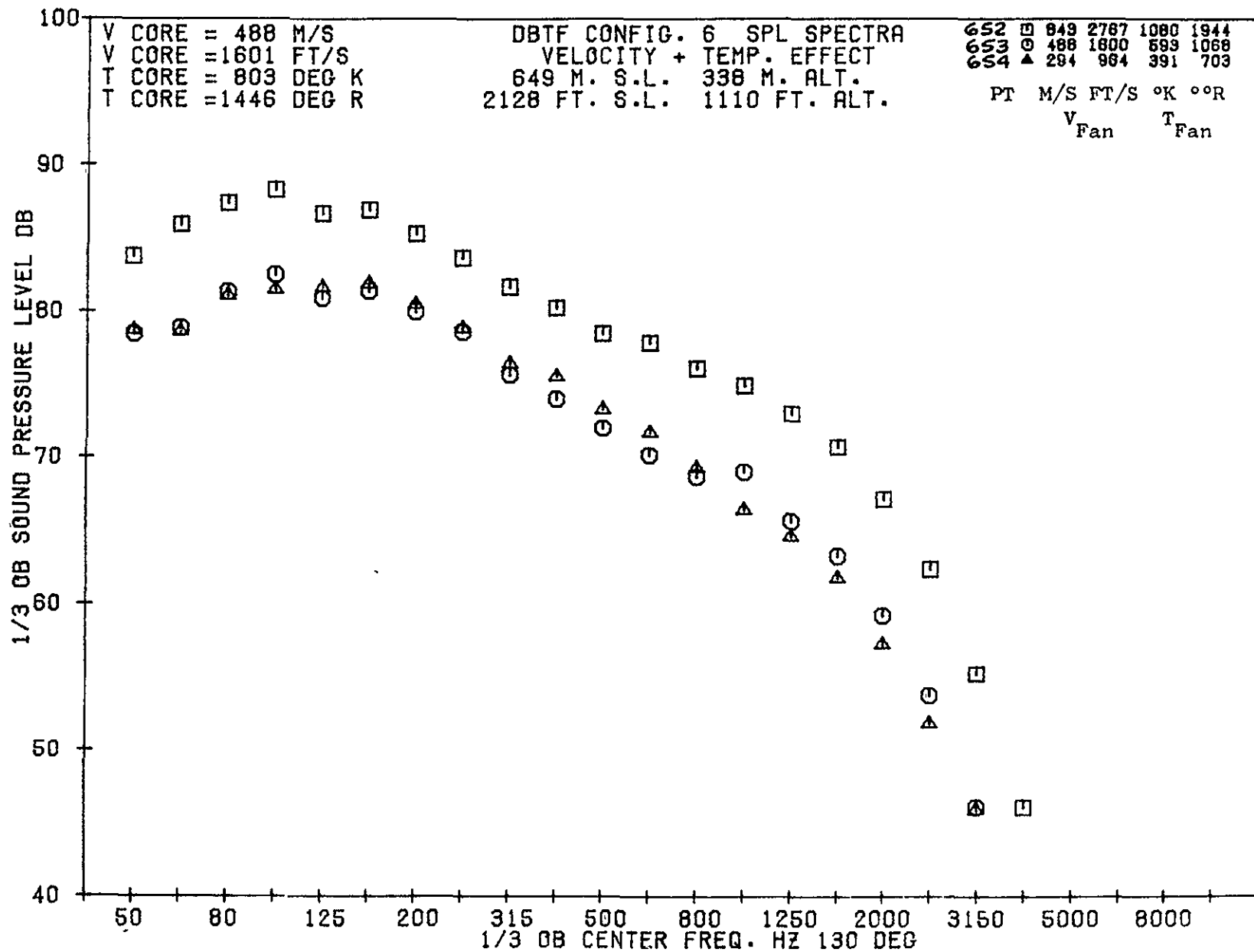


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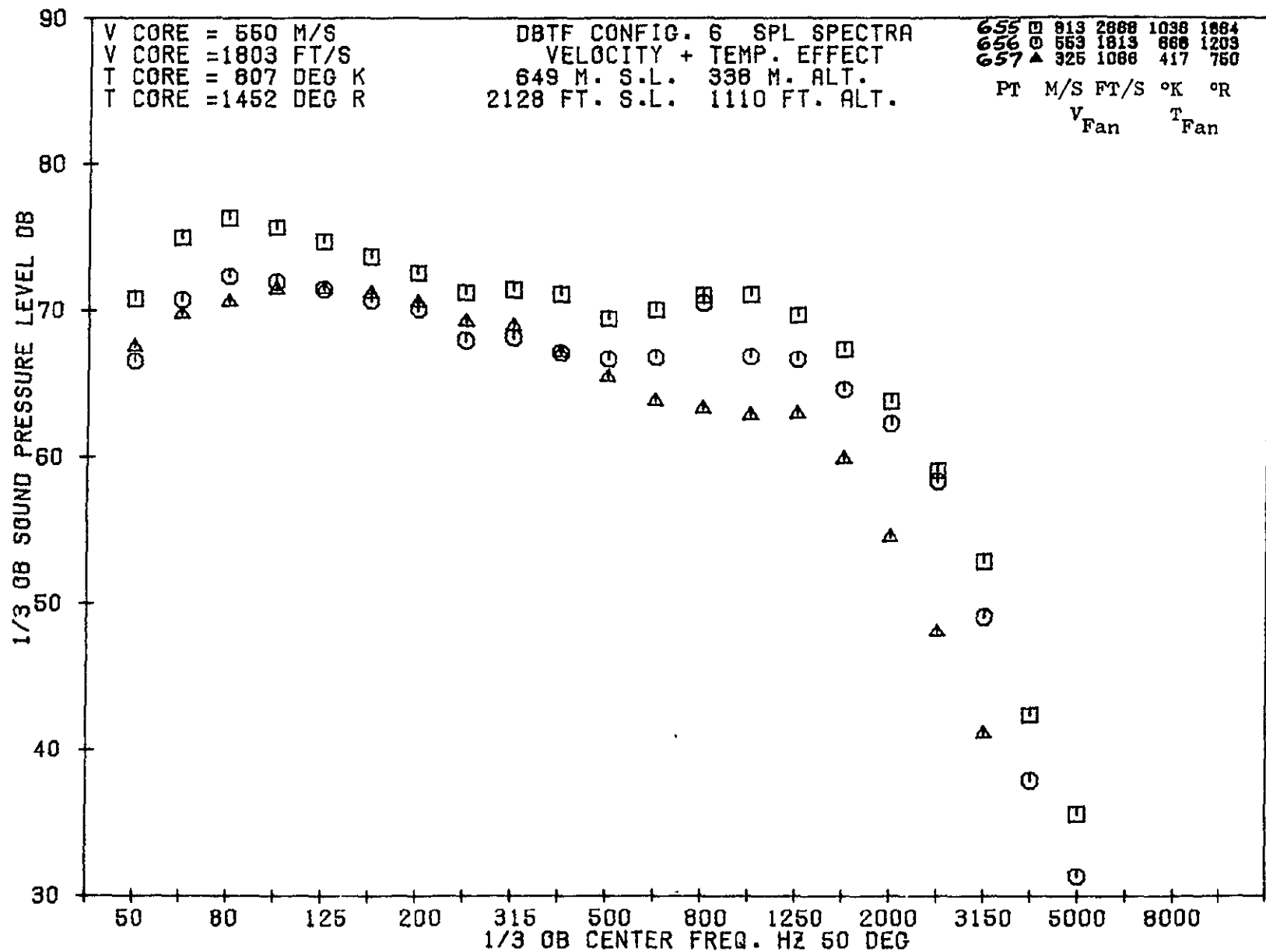
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4.266



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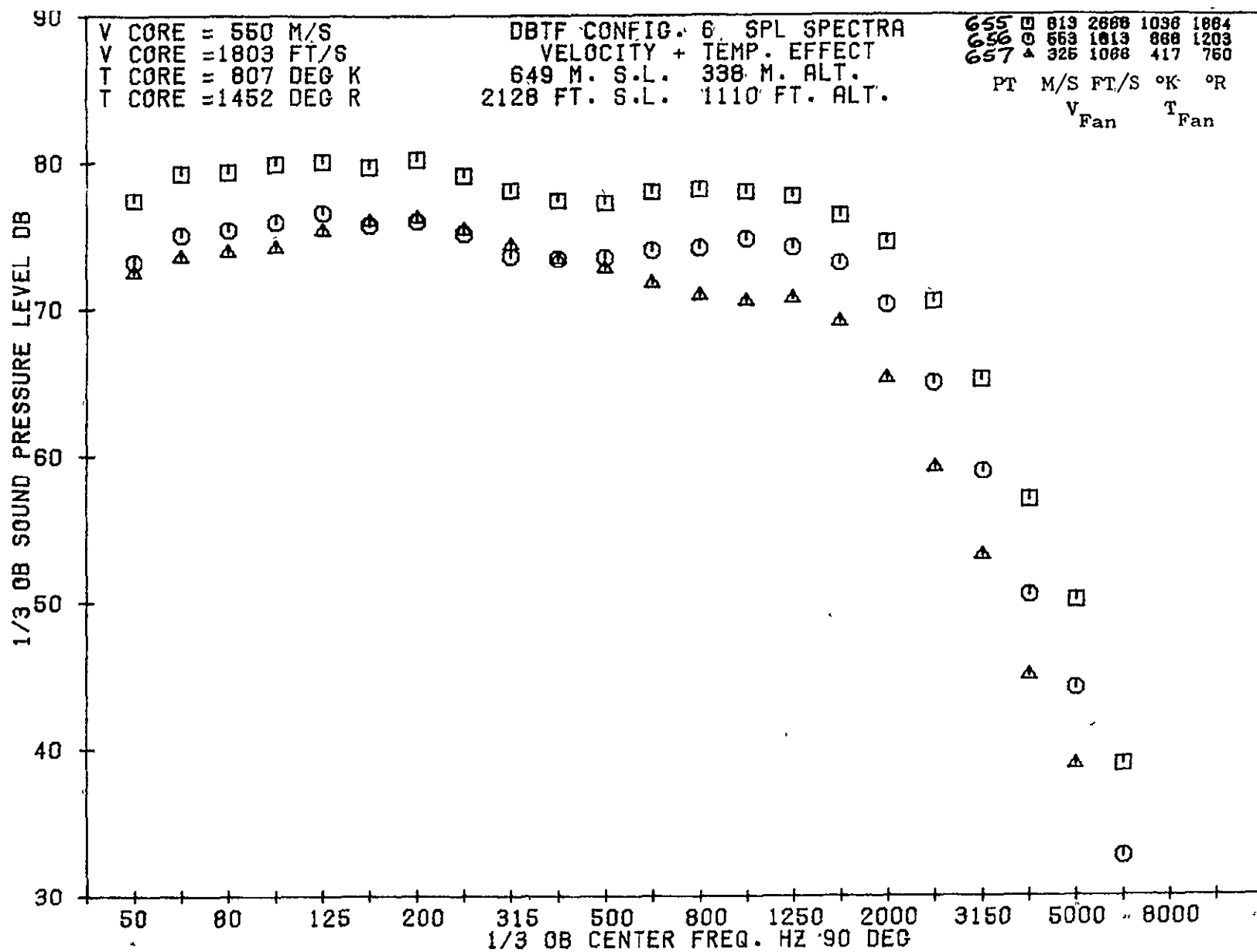


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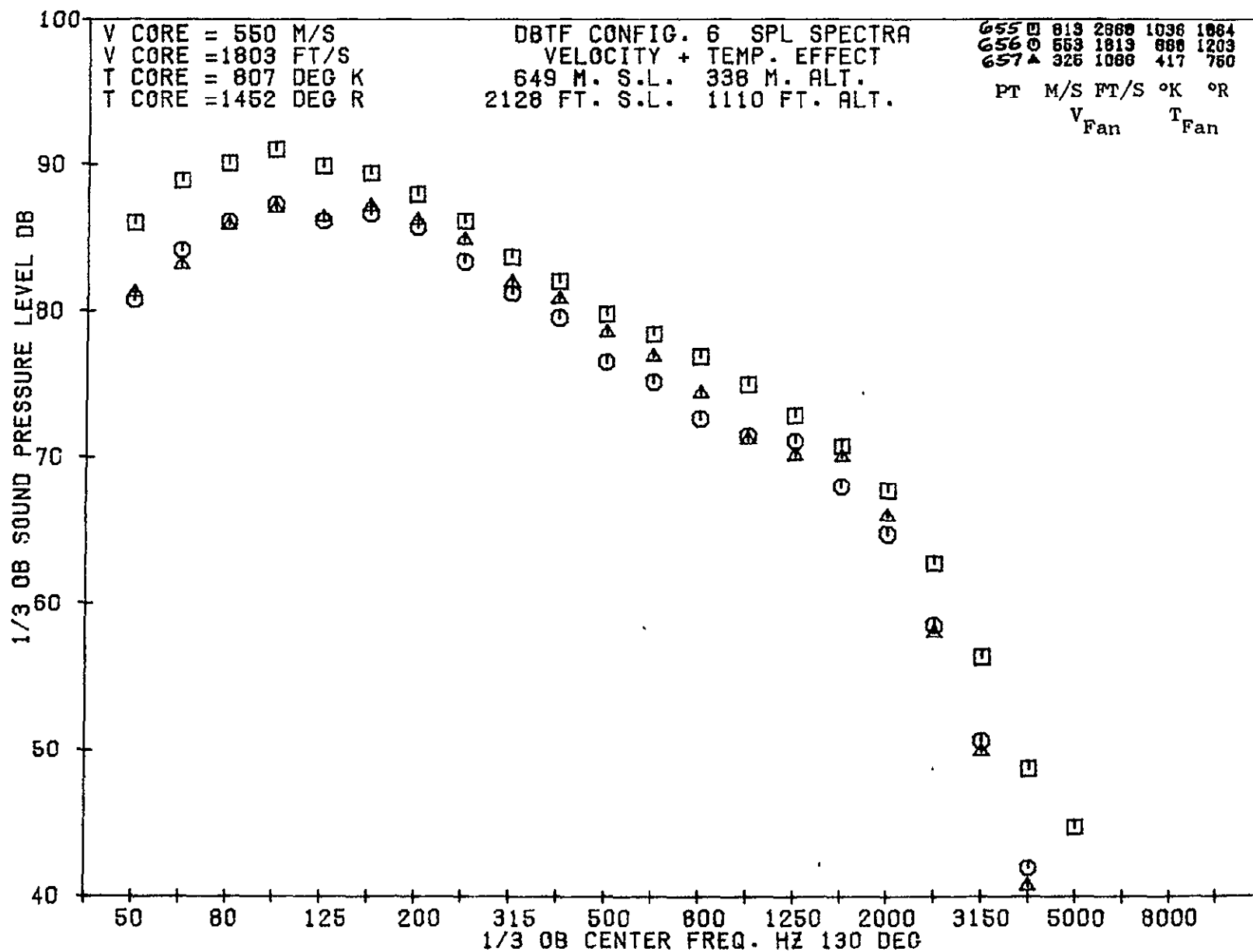
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1504



08/13/75
5R947-001

79 BURCH



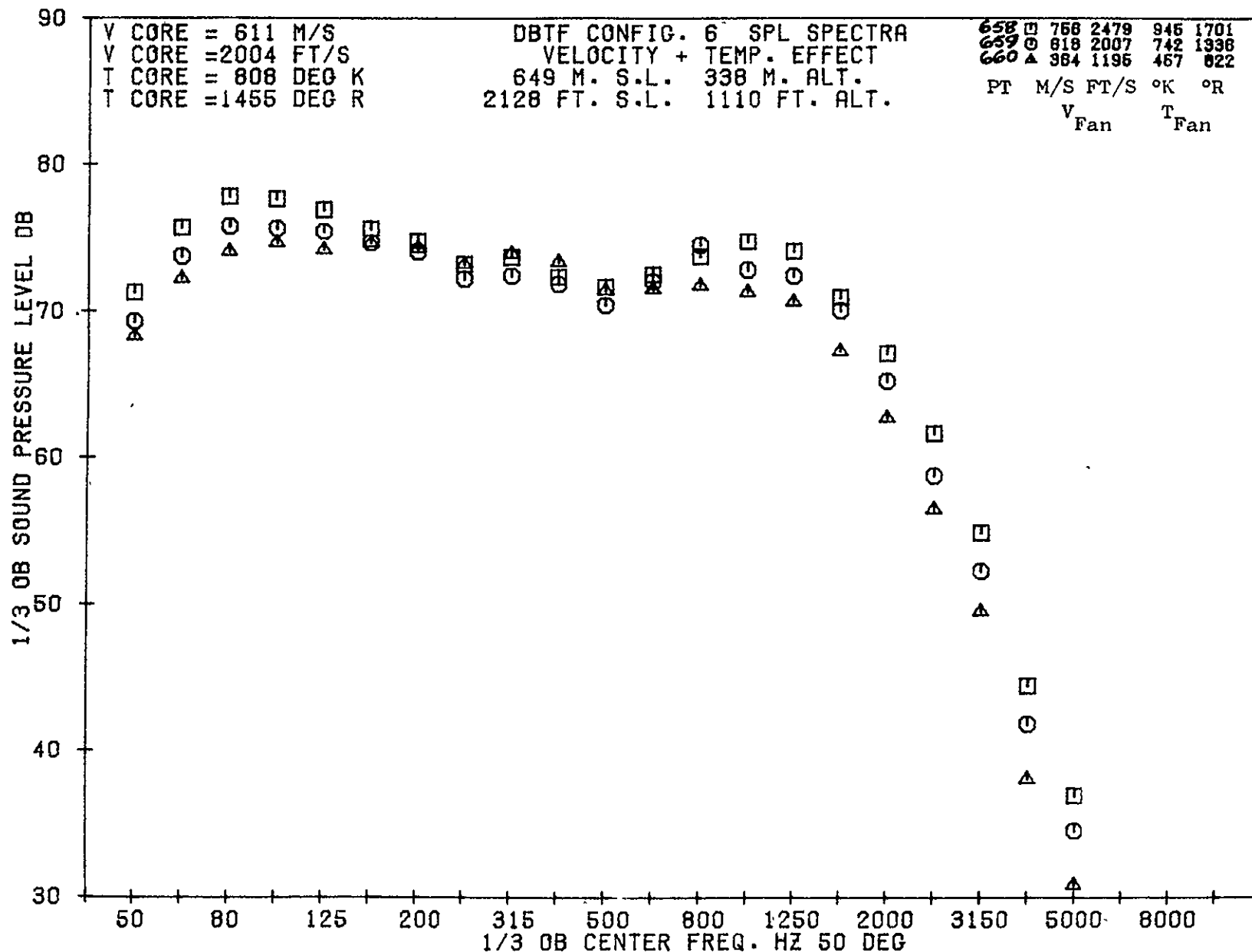
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79 BURCH A.

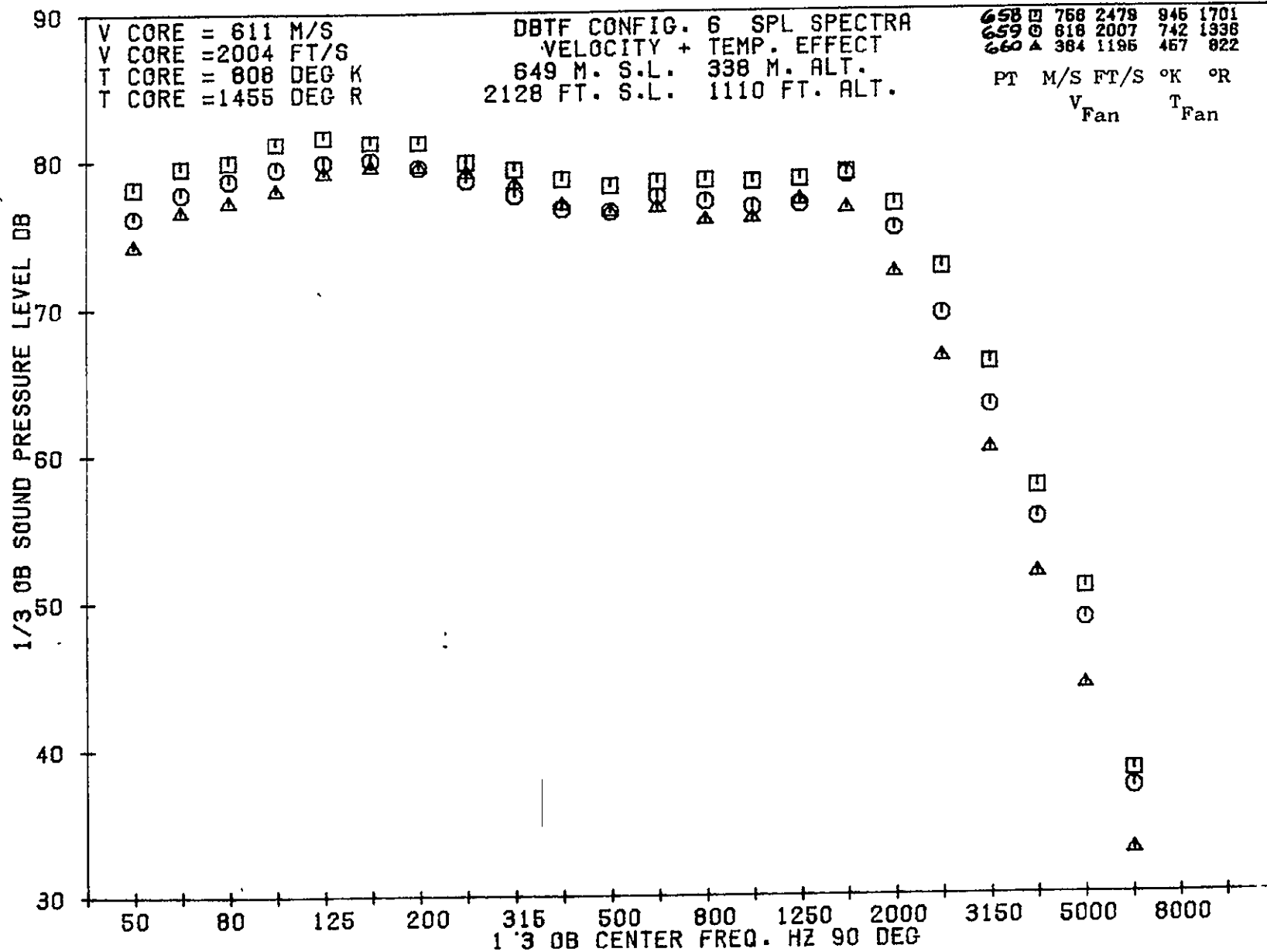
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1506



08/13/75
5R947-001

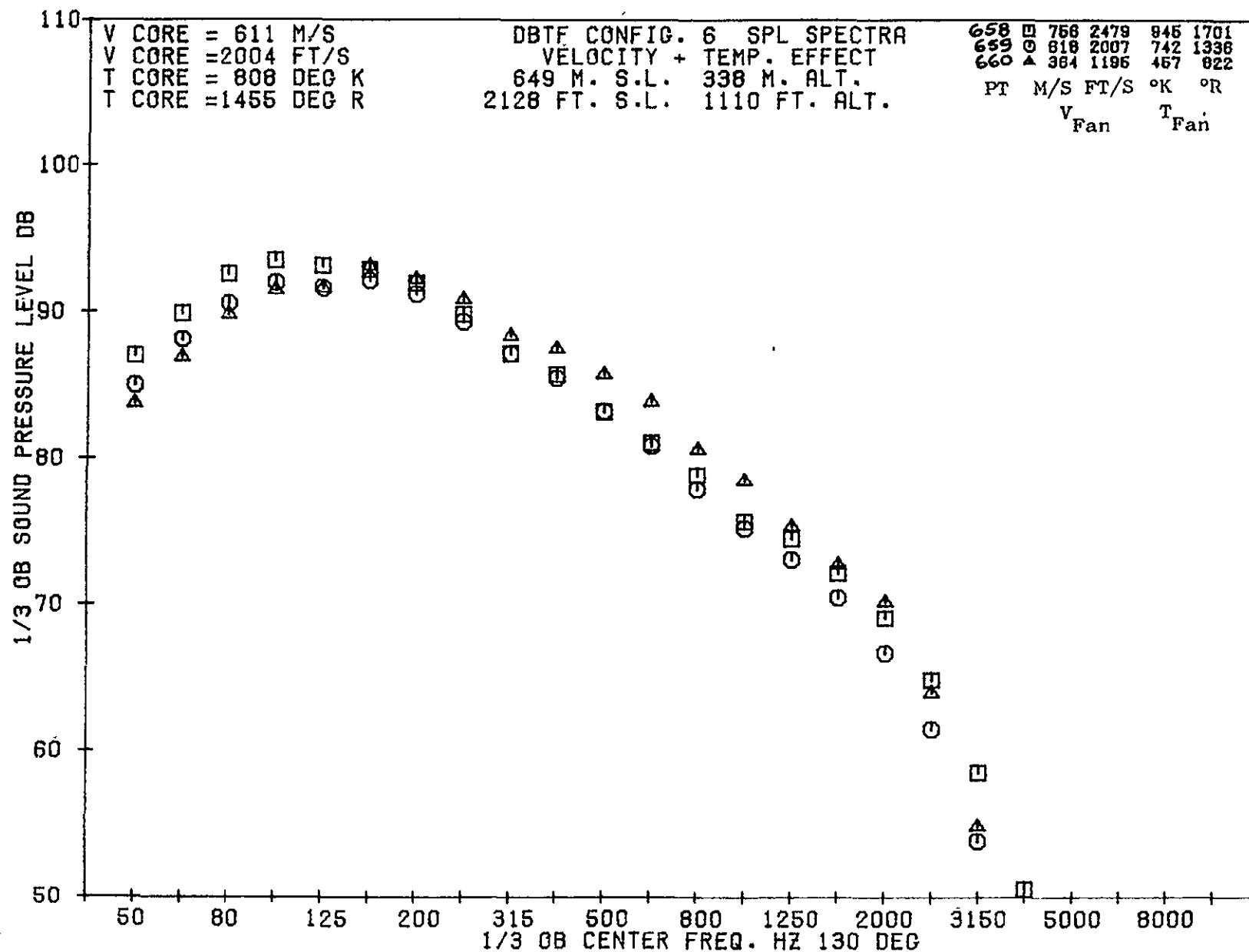
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08/13/75
FRQ47-001

79 BURCH A.

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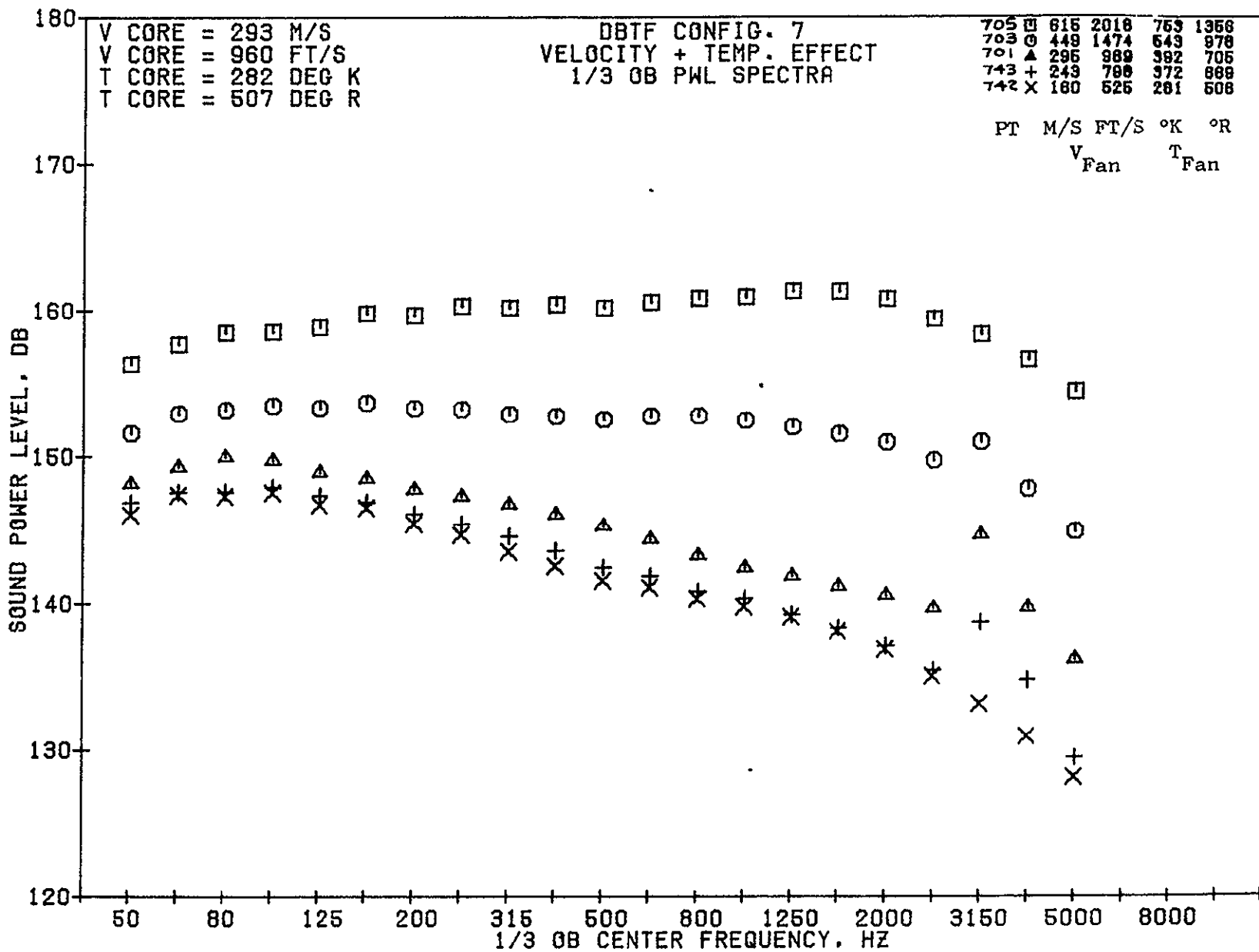


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08/13/75
5R947-001

79 BUR

1-1-74

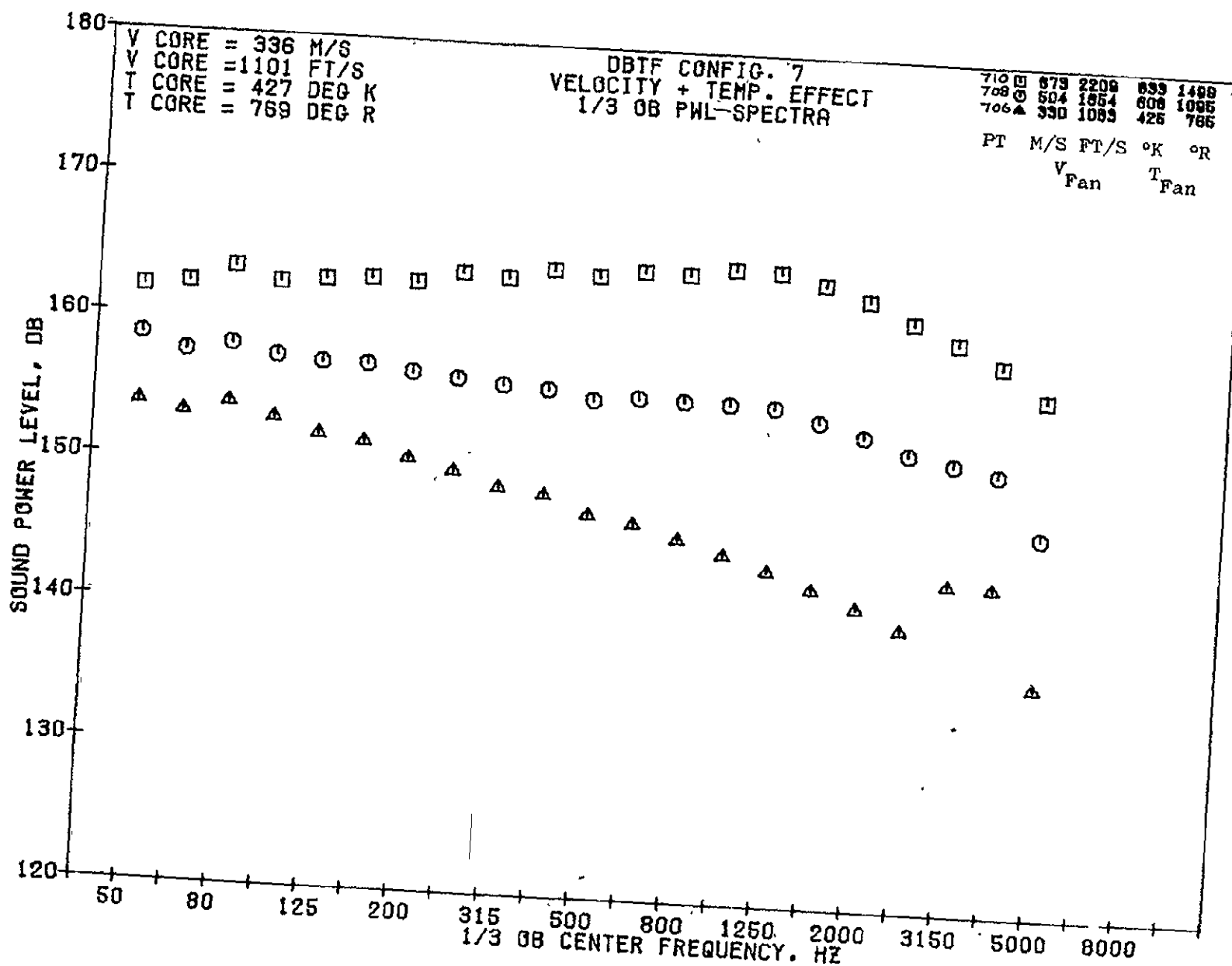


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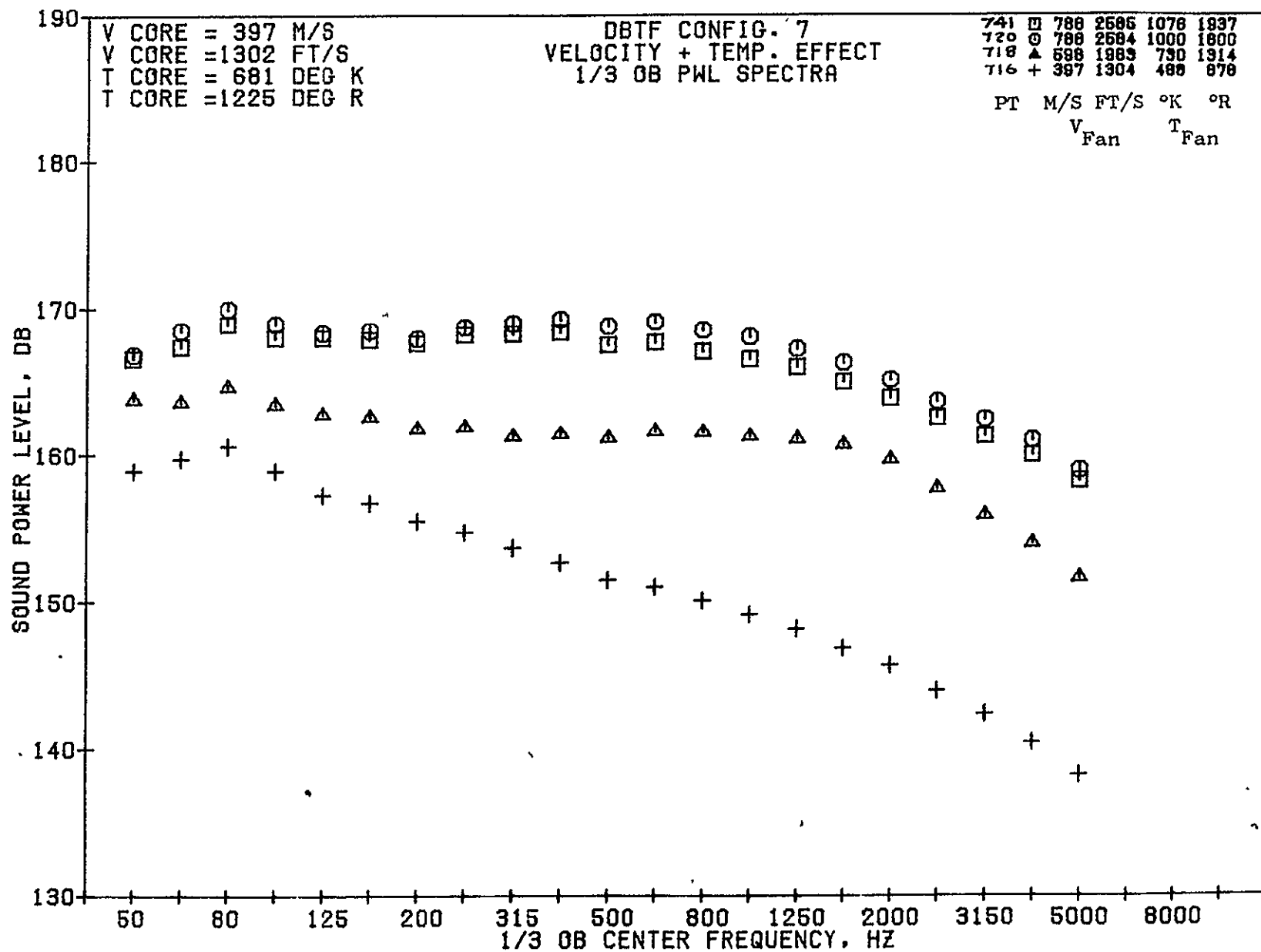
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08/22/75
5R682-001

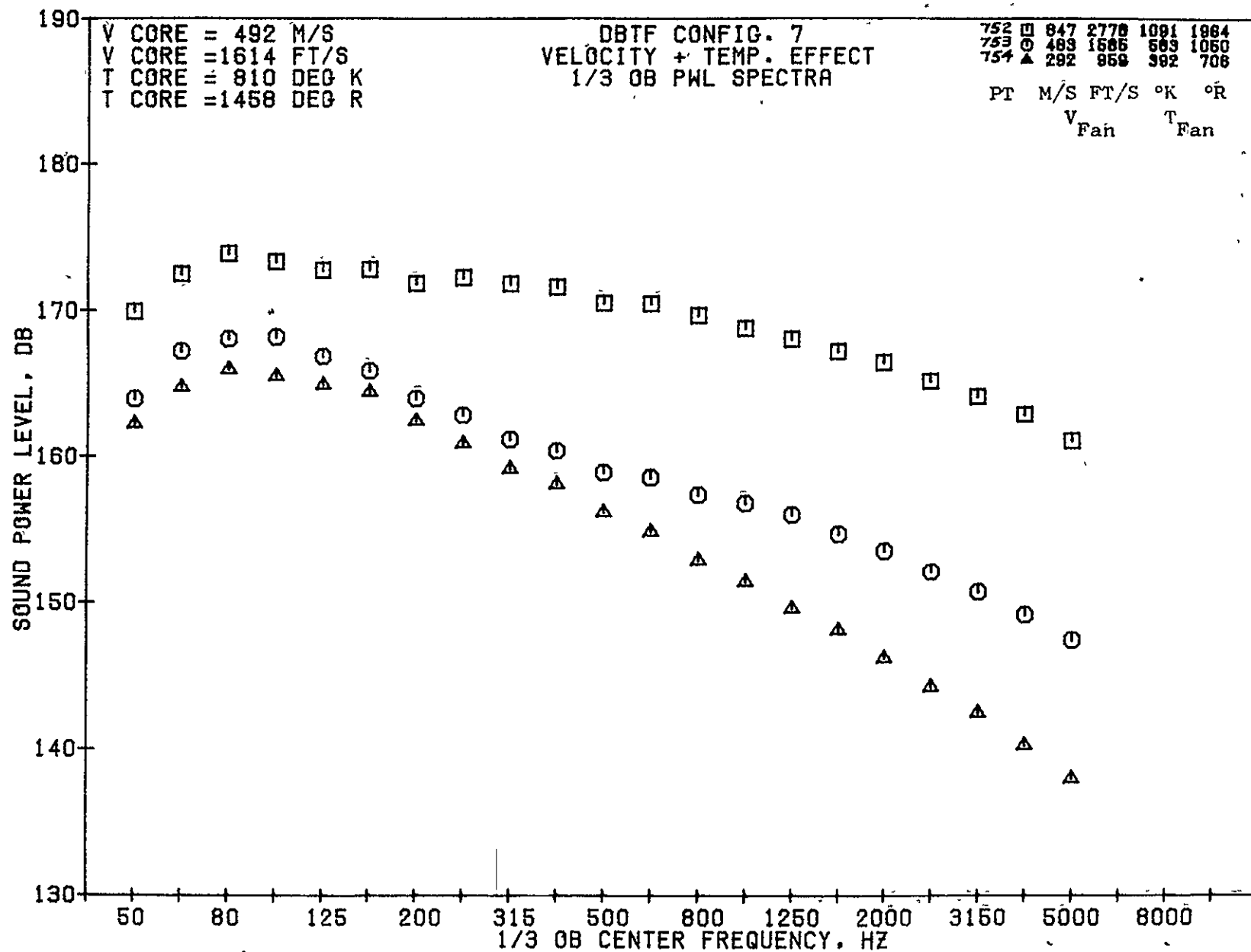
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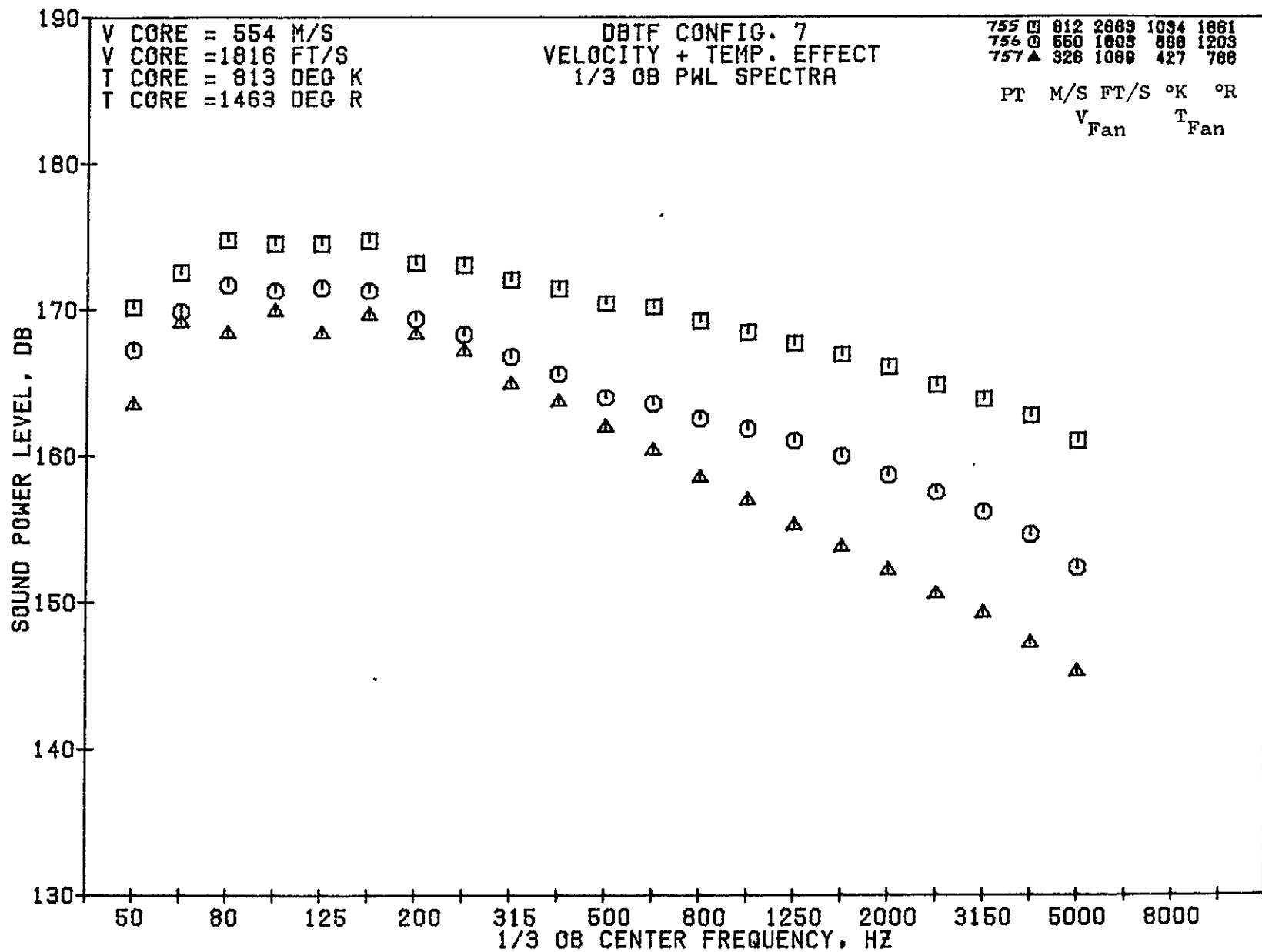
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5R412-001

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08/19/75
5R412-001

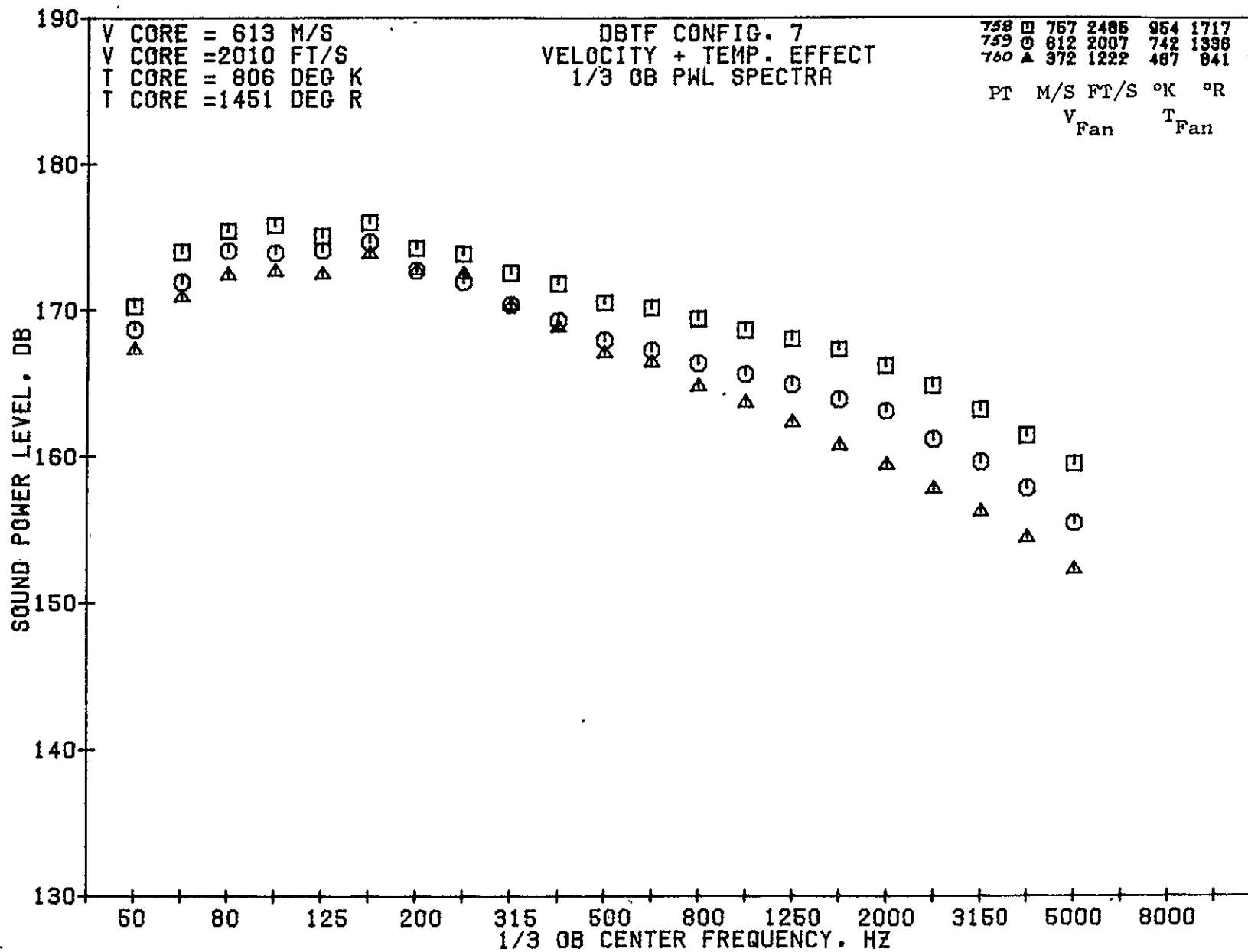
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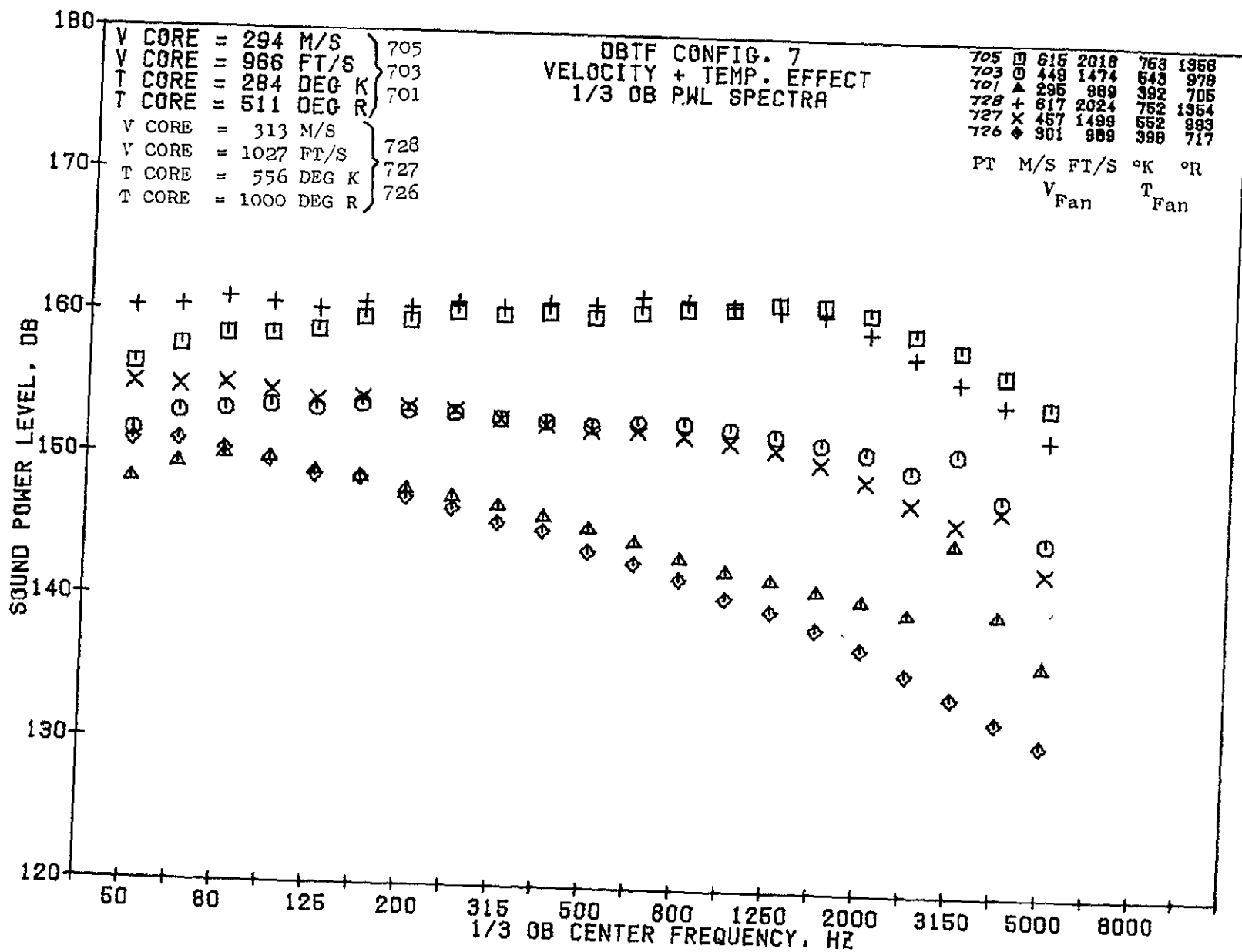
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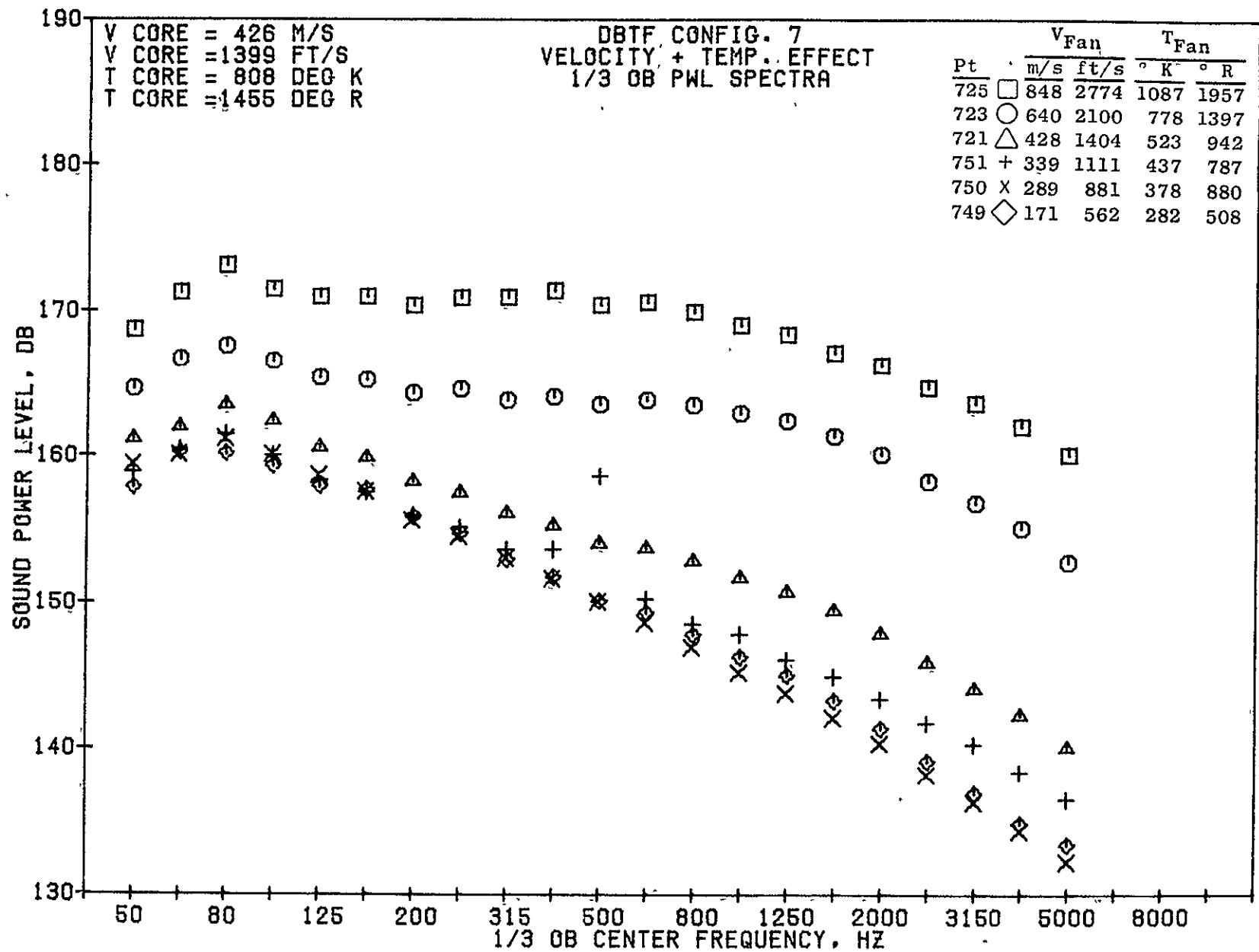
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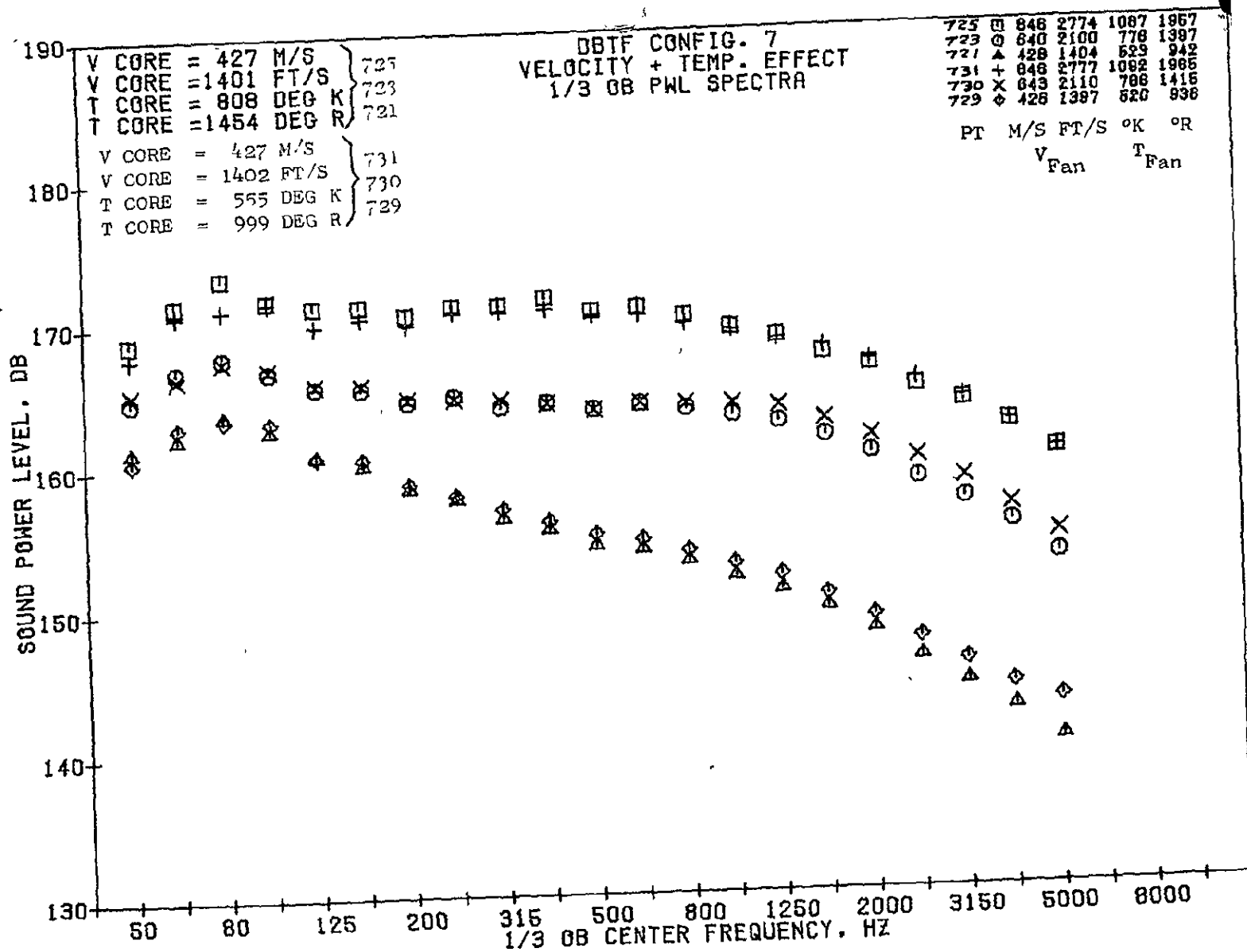
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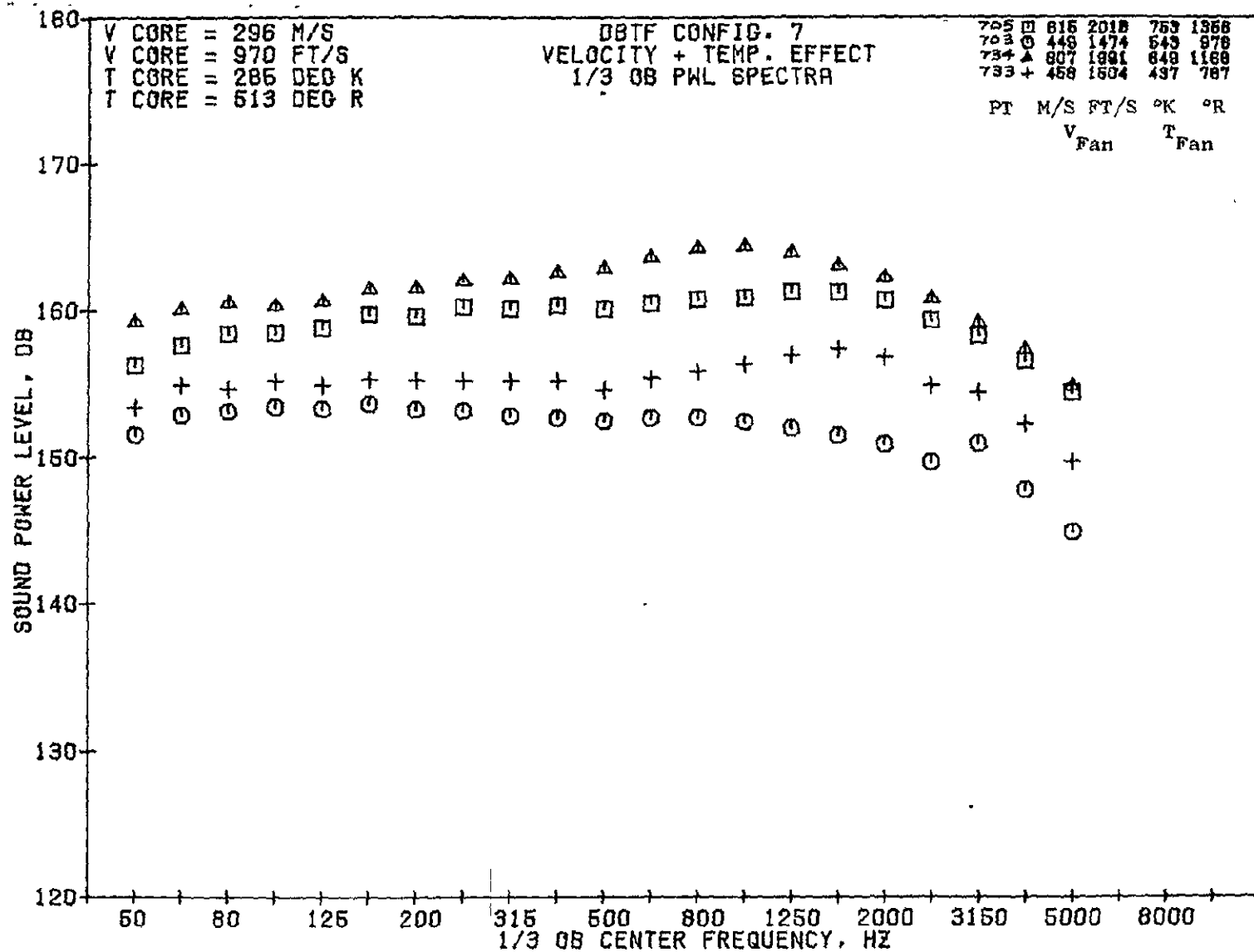
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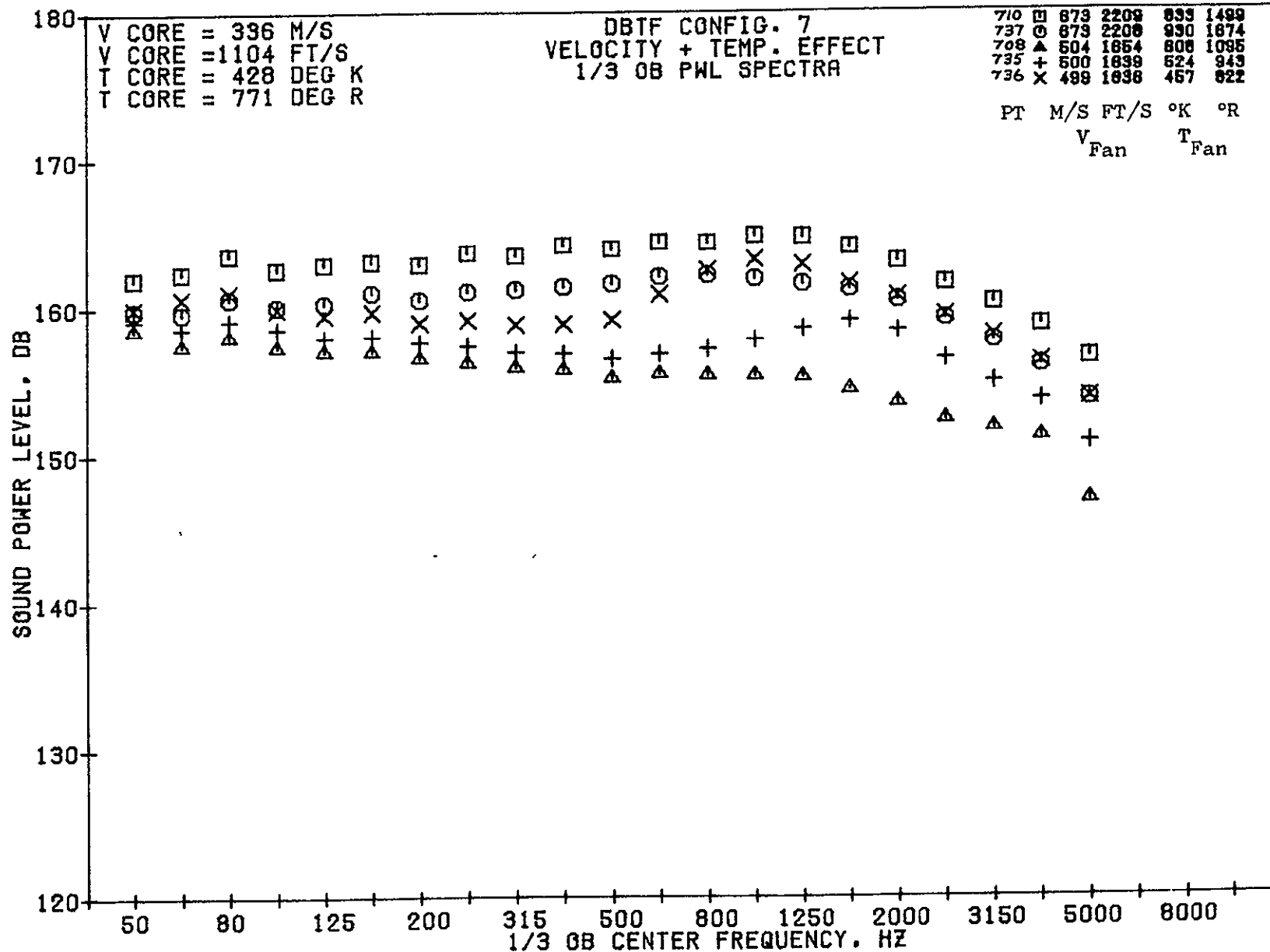
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08/19/75
5R412-001

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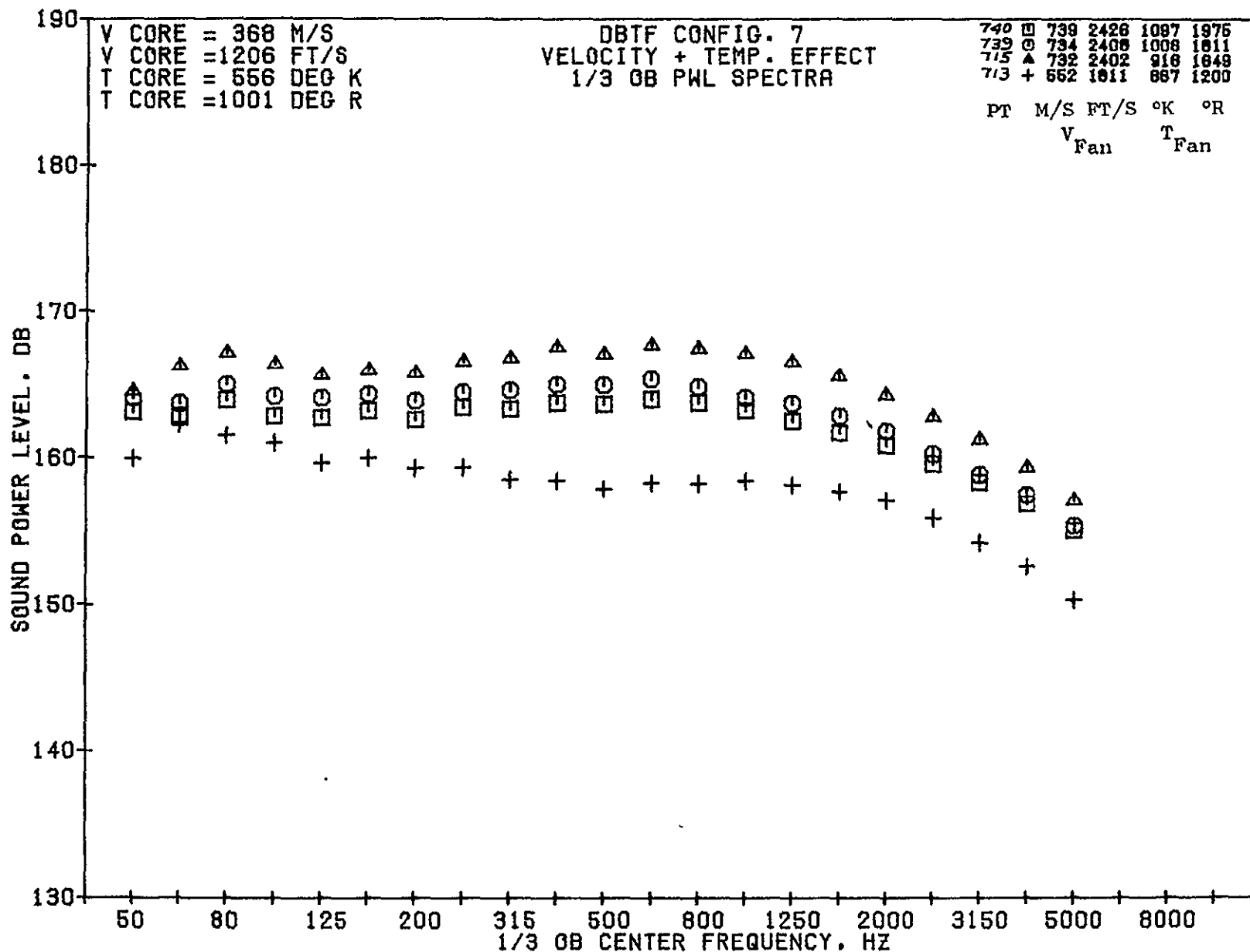
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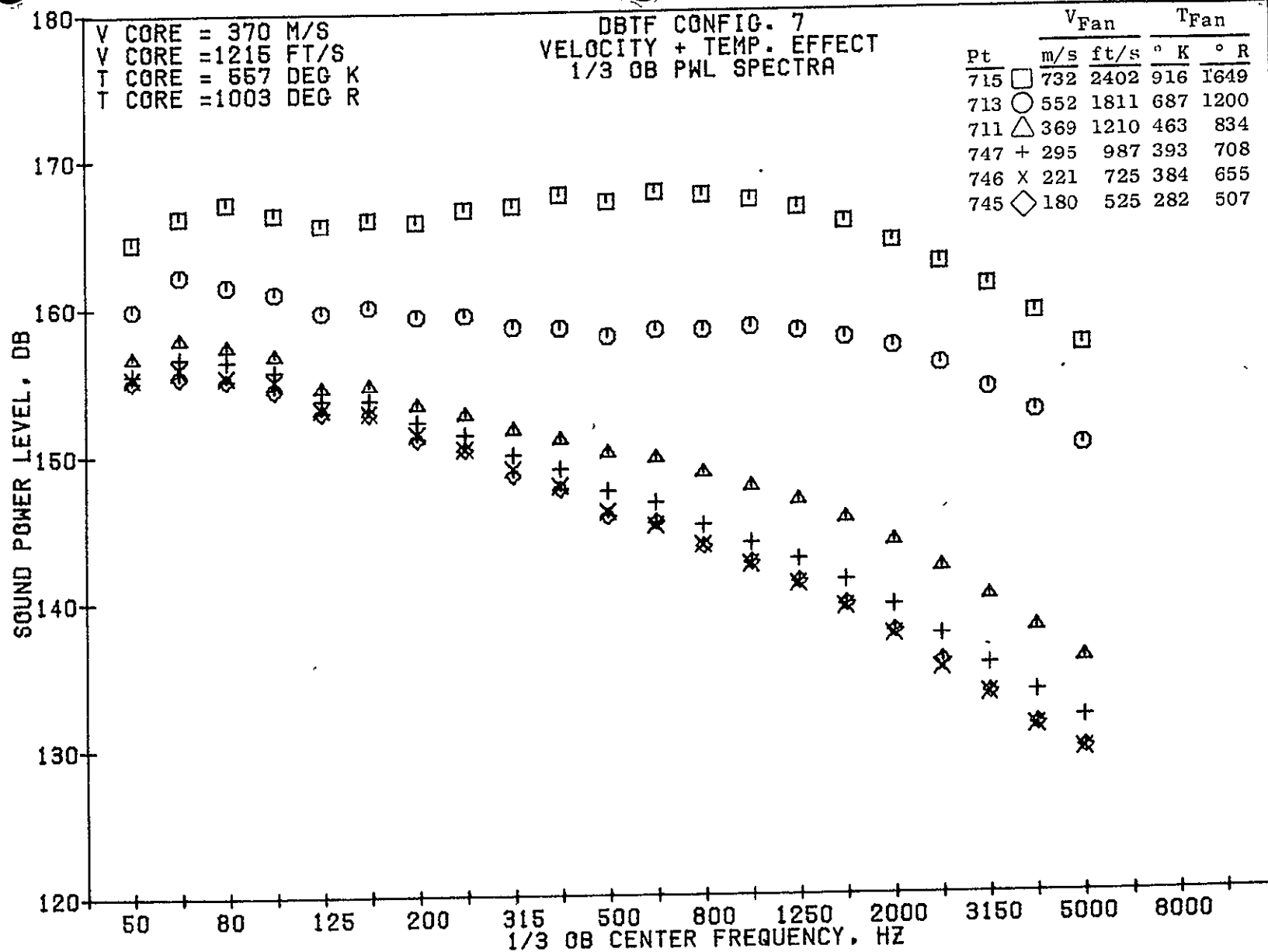
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5R412-001

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11-284



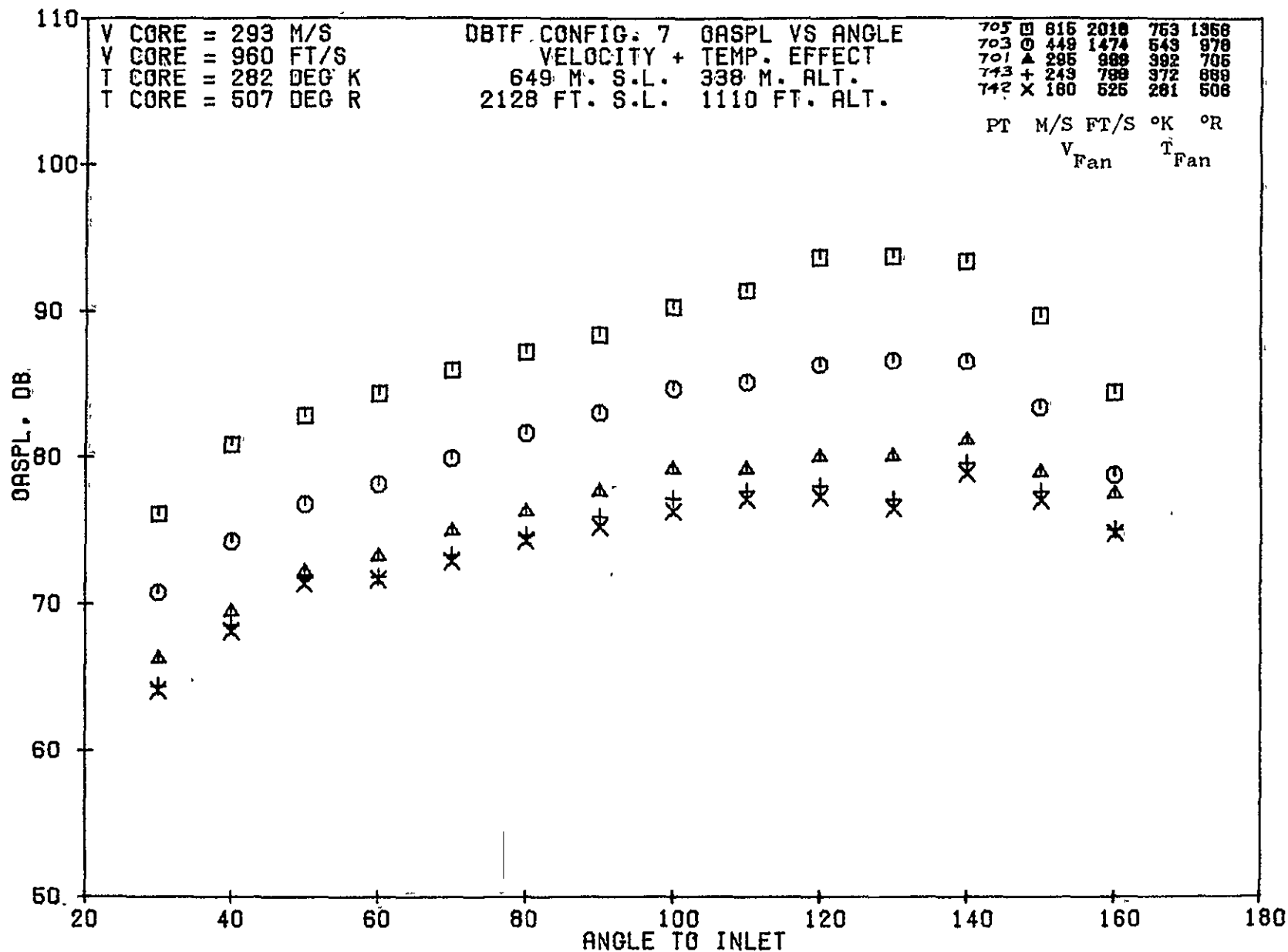
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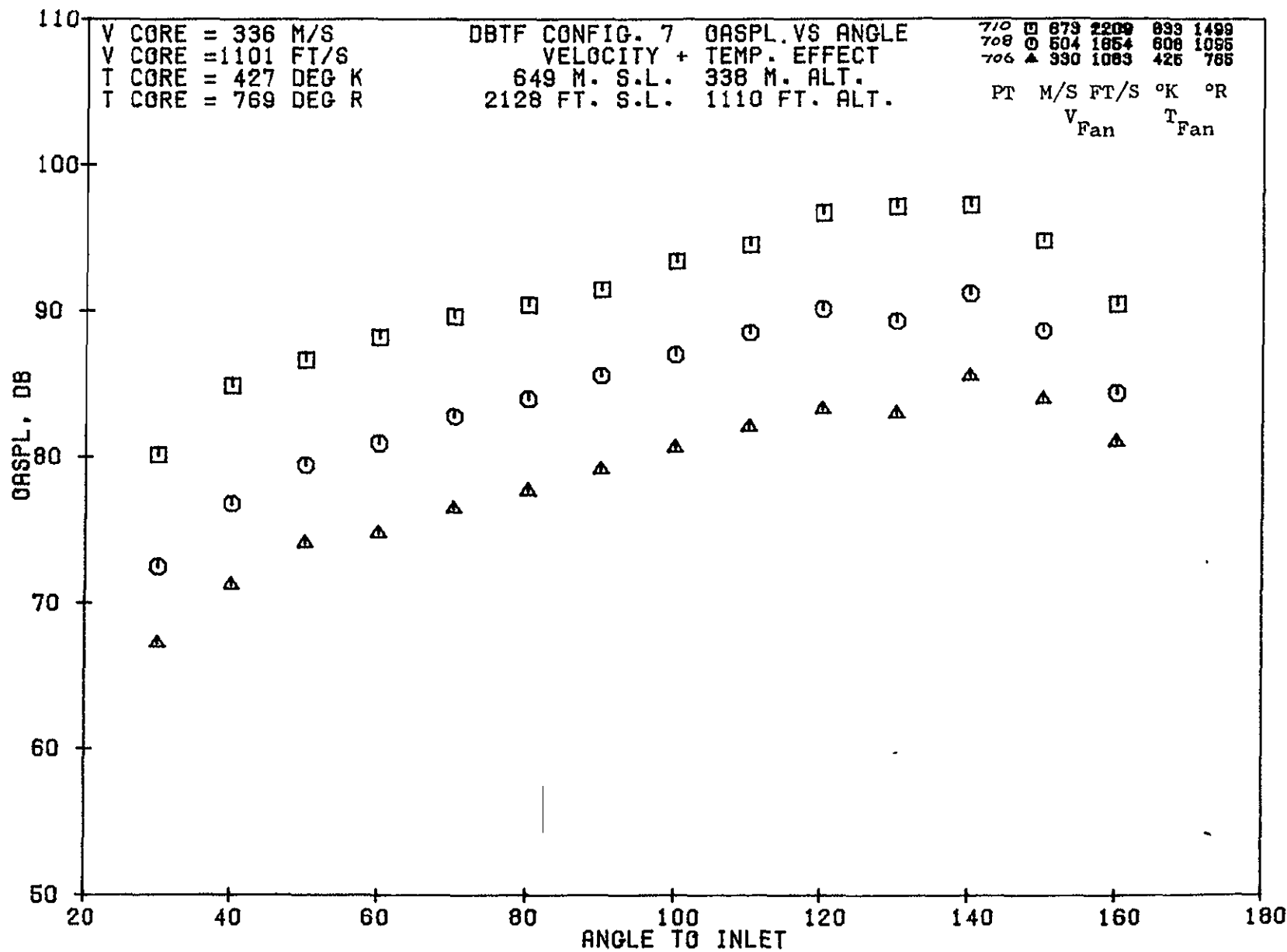
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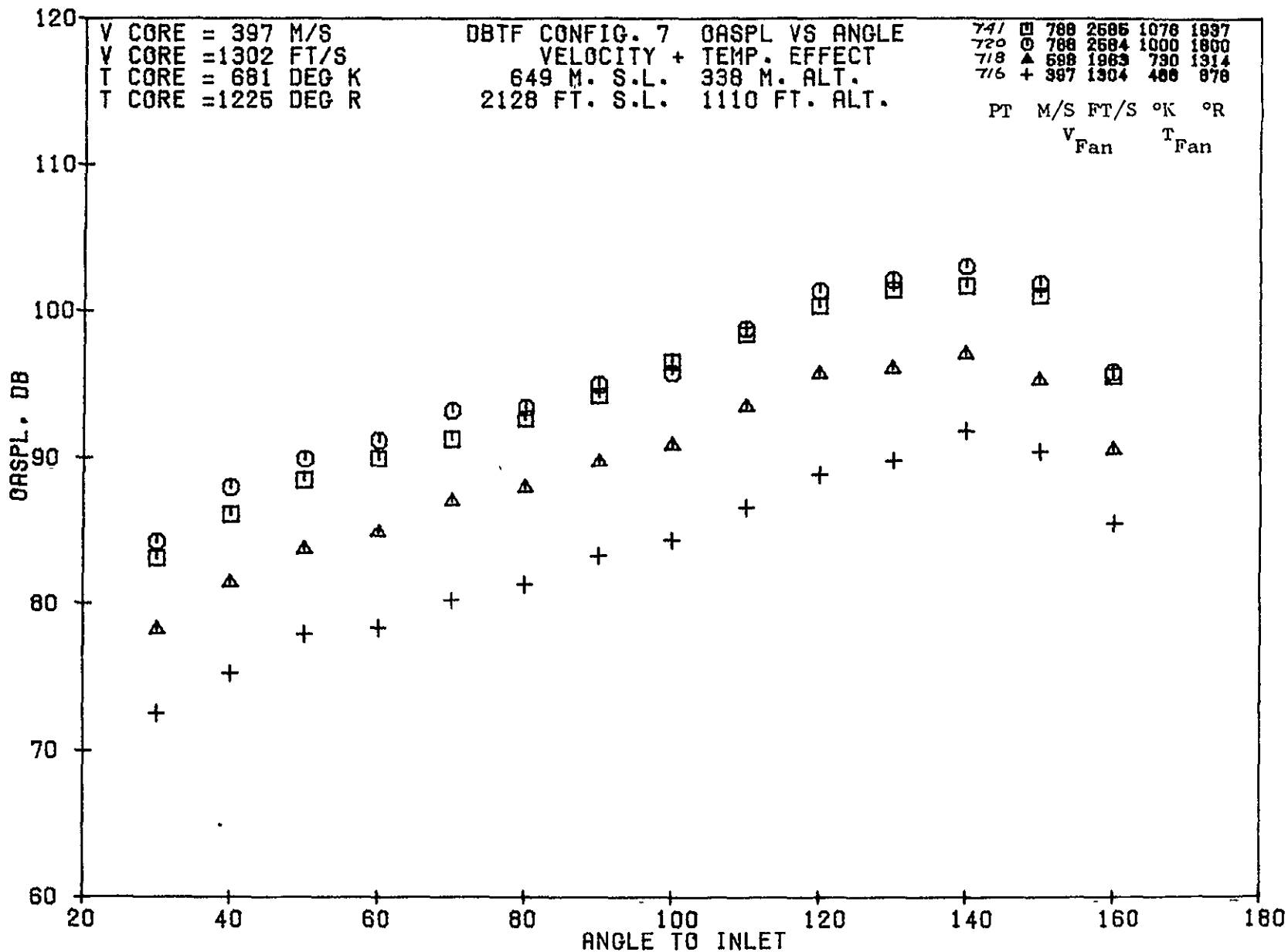


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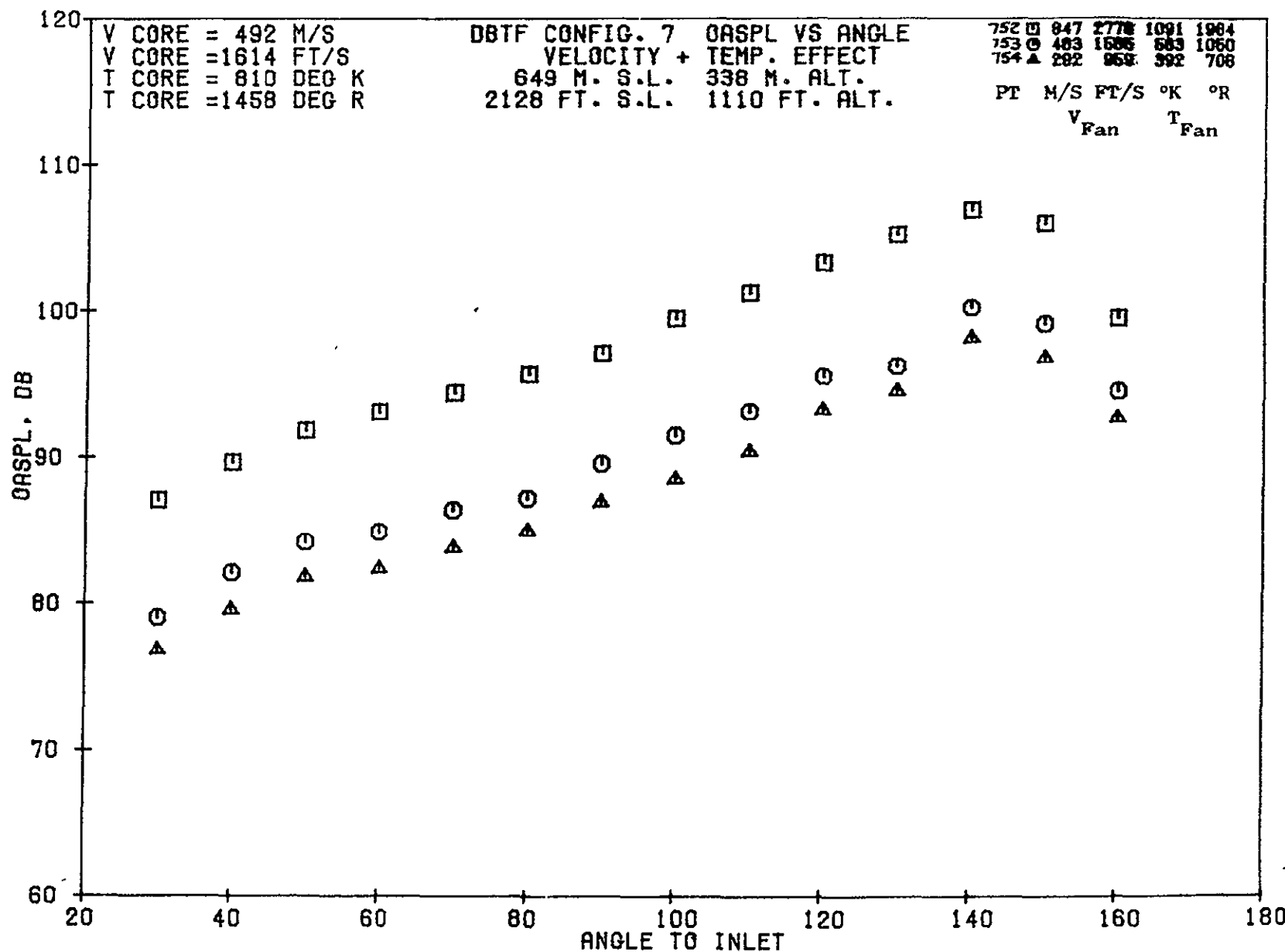
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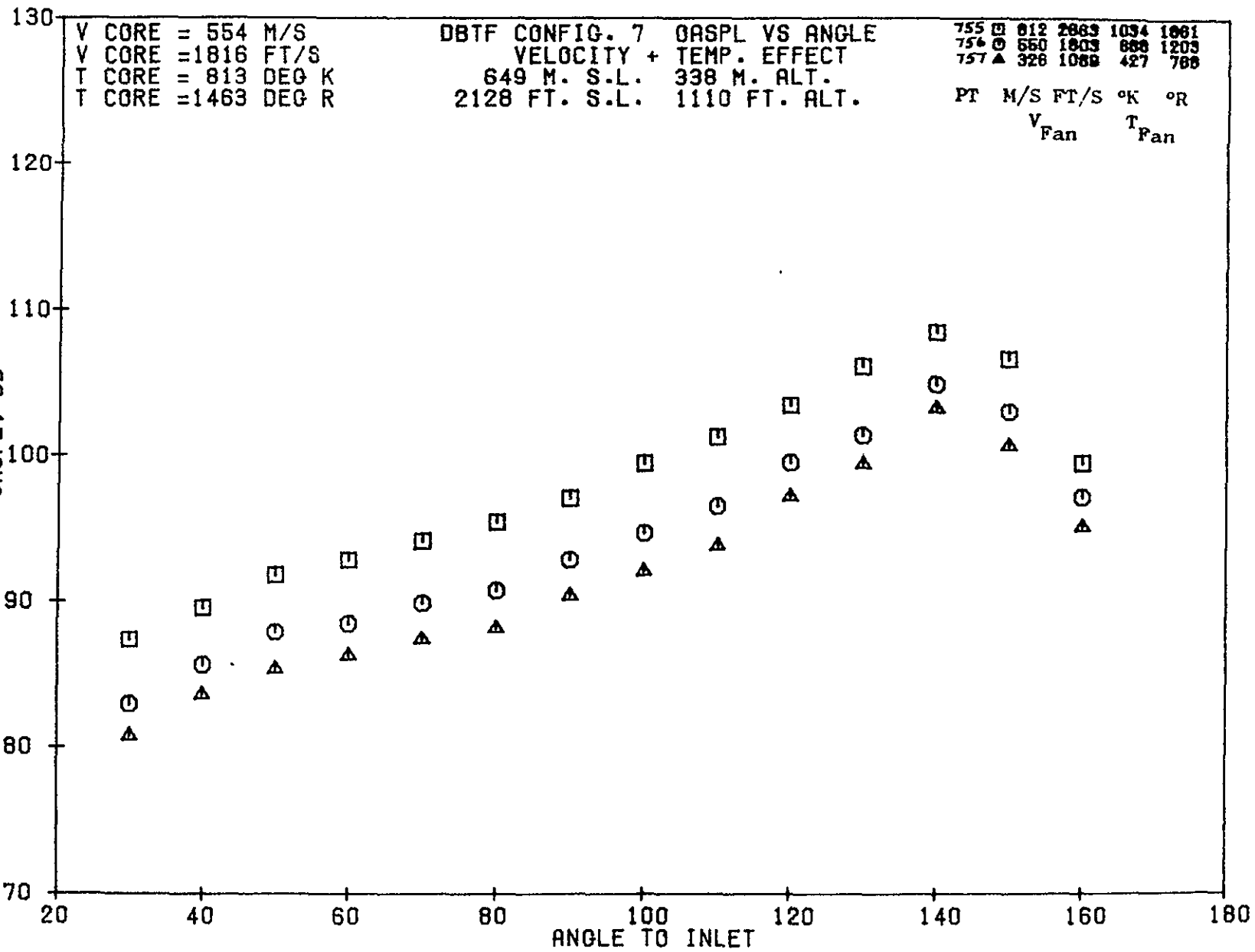


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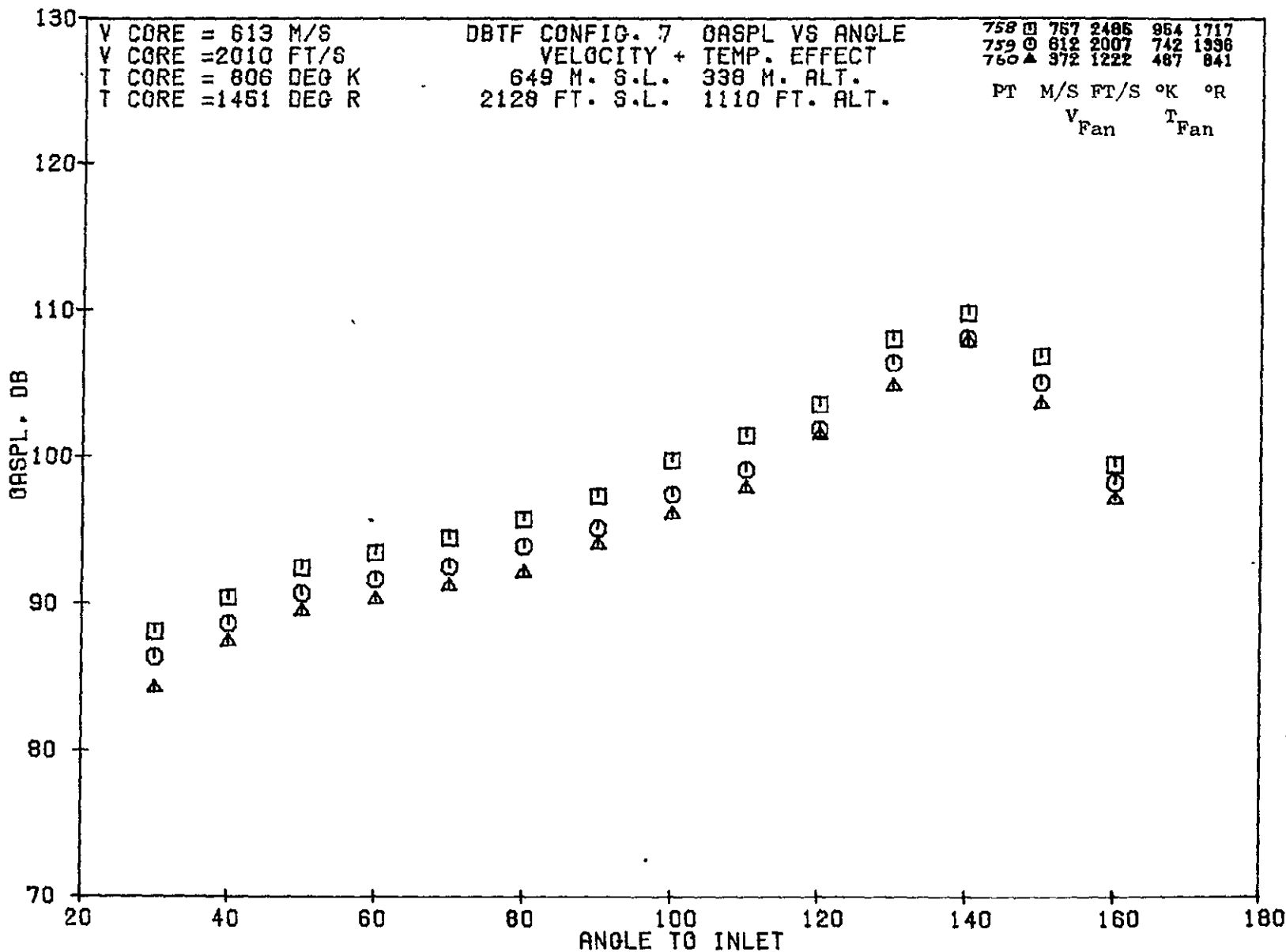
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08/19/75
5R412-001

79 BURCH A.

289



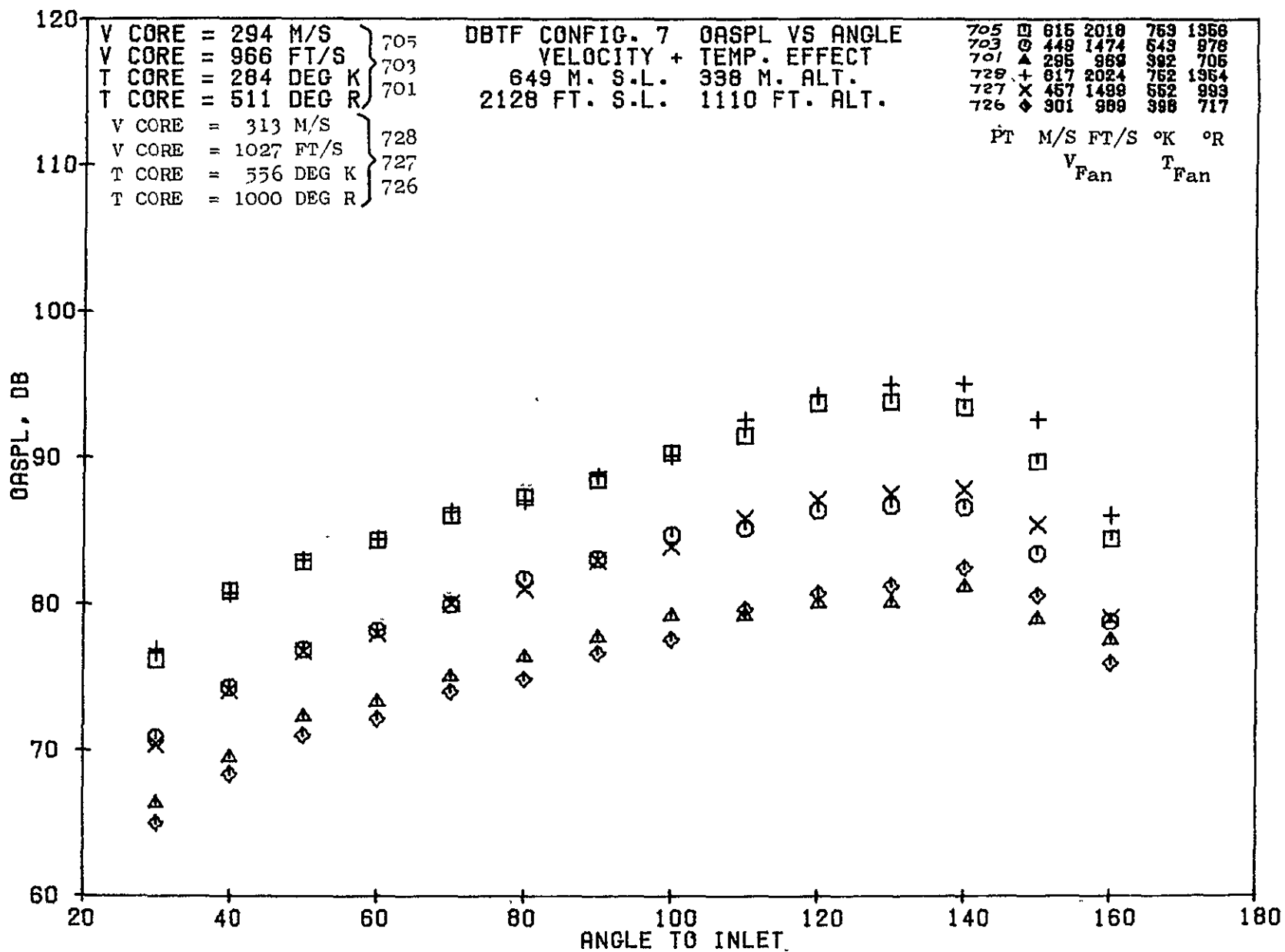
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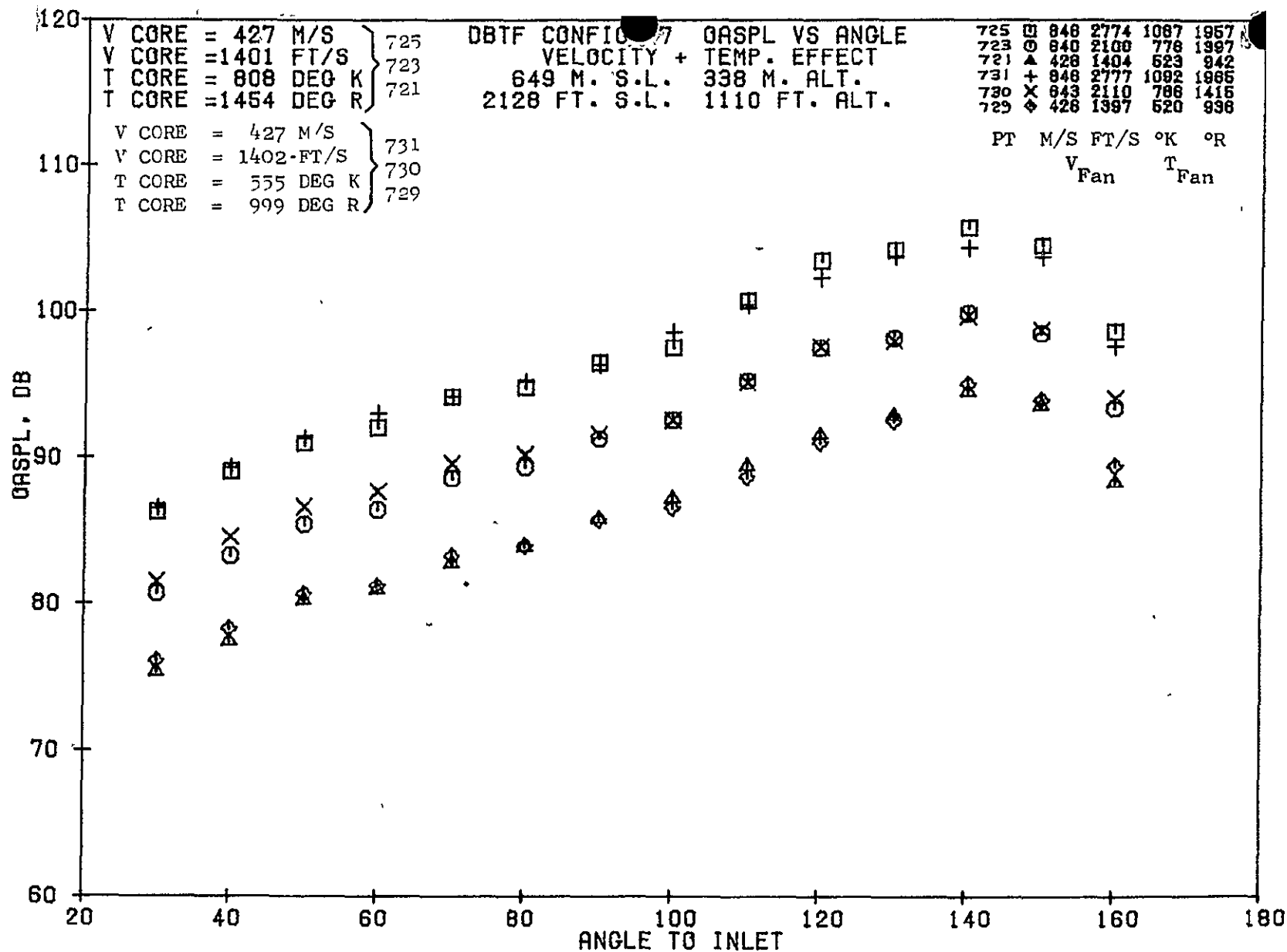
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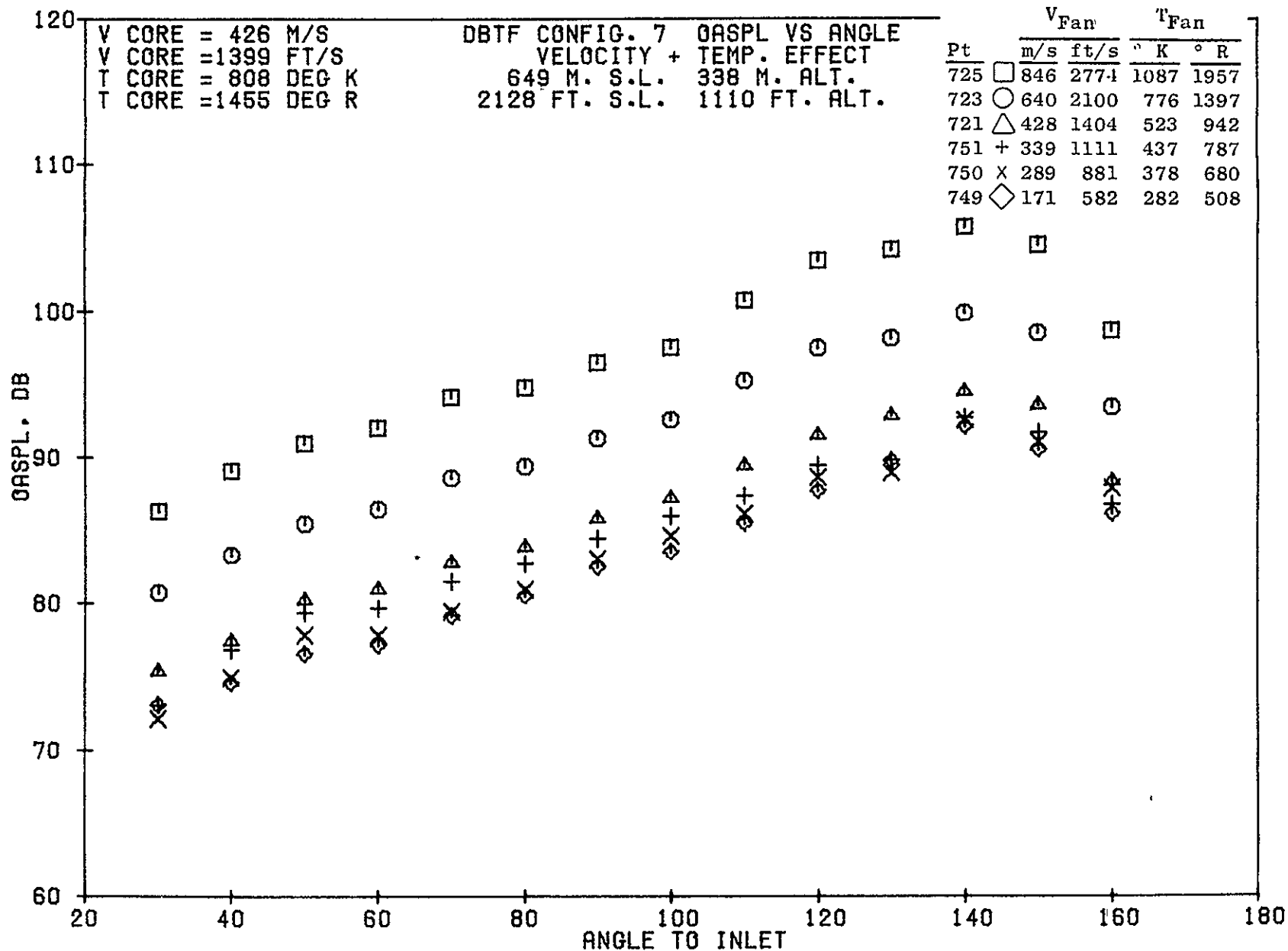
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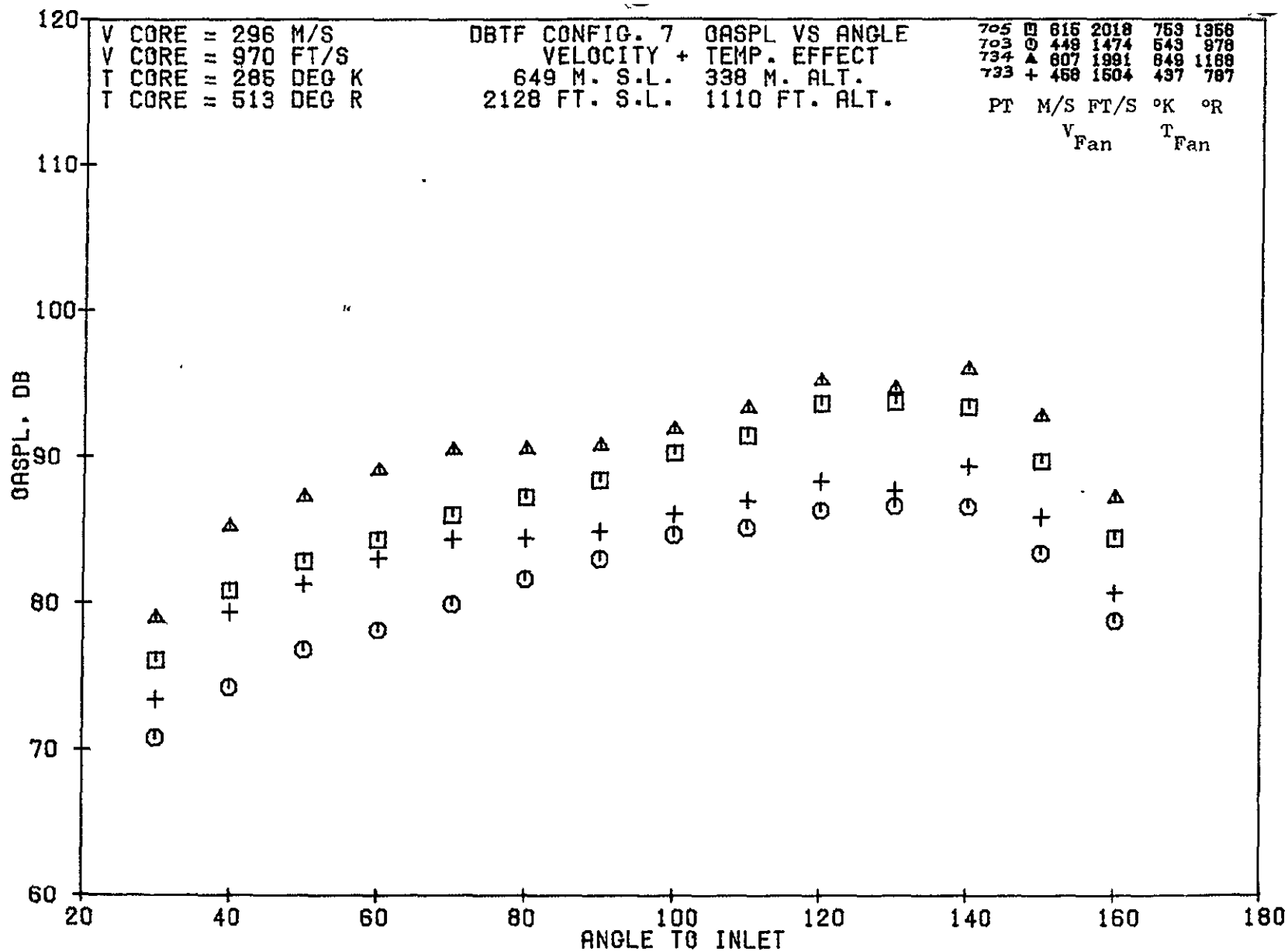
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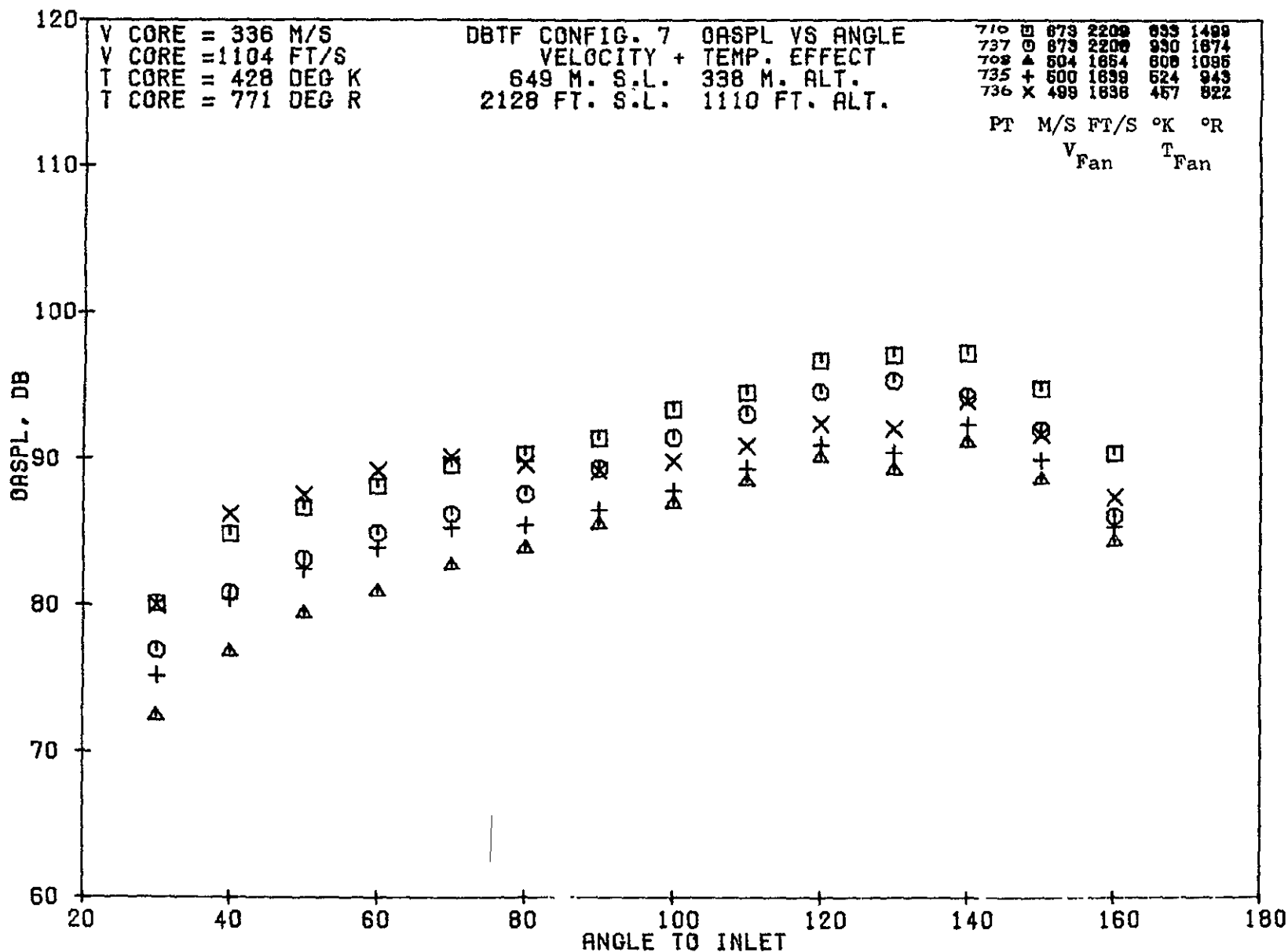
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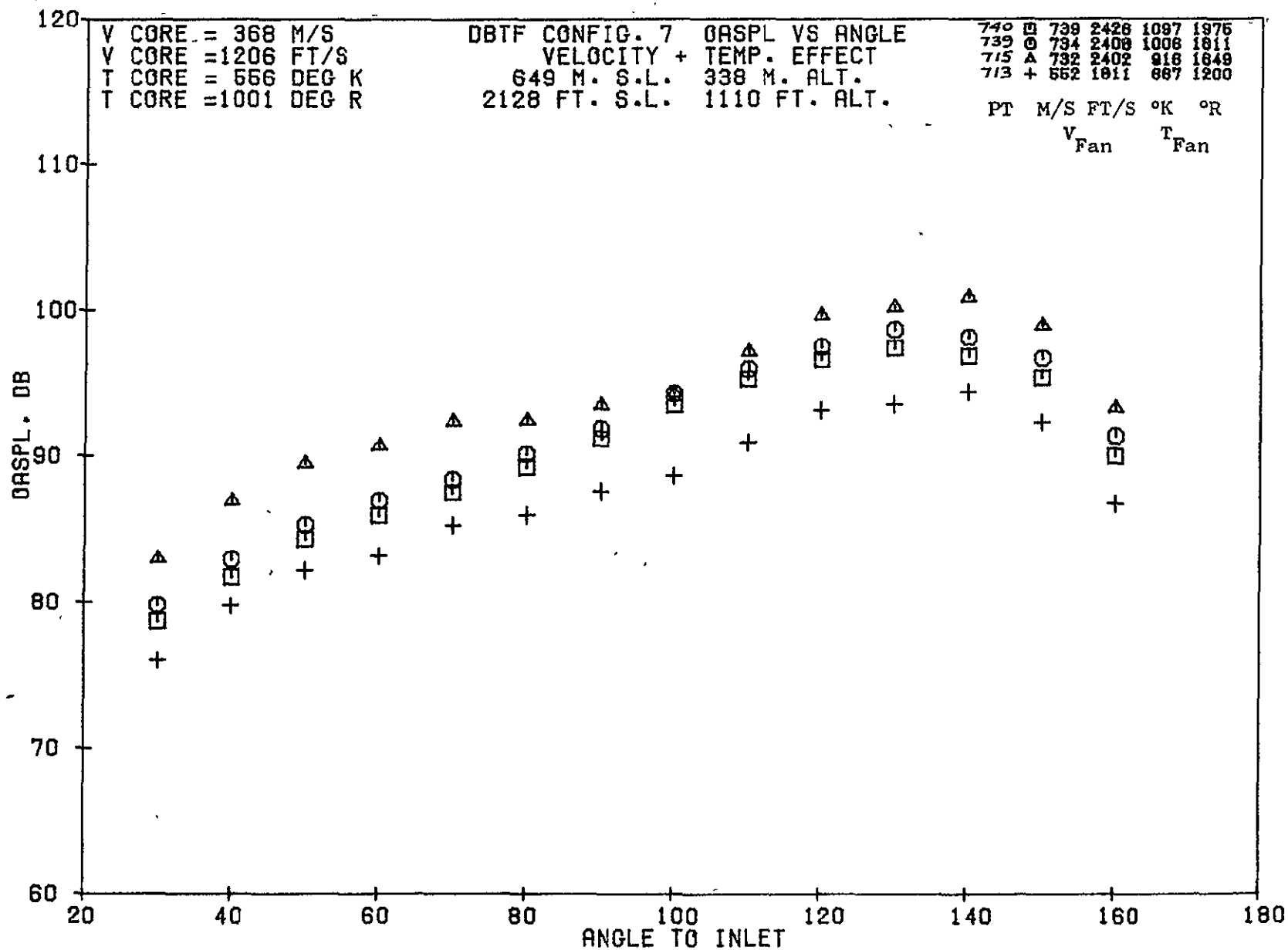
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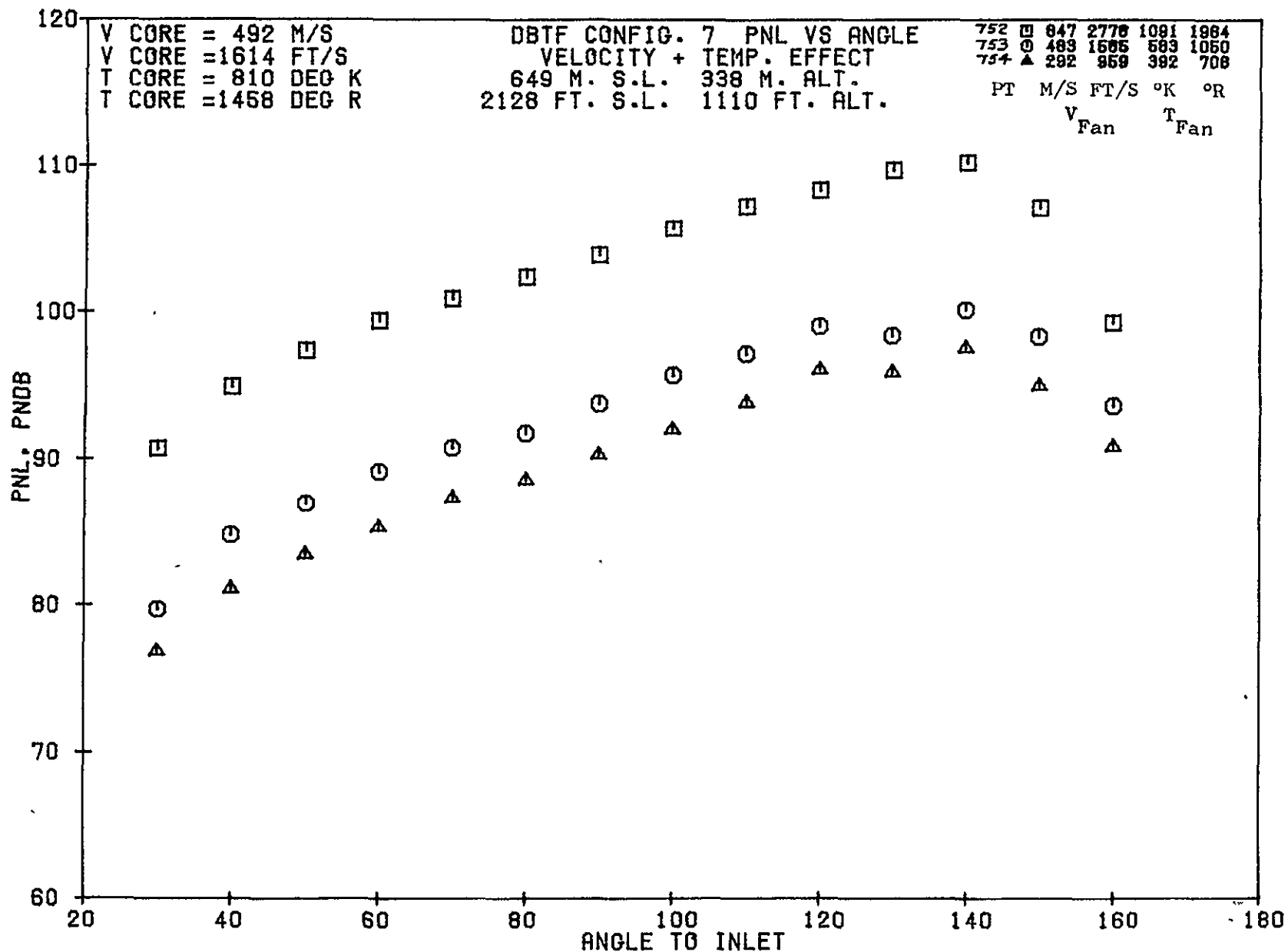


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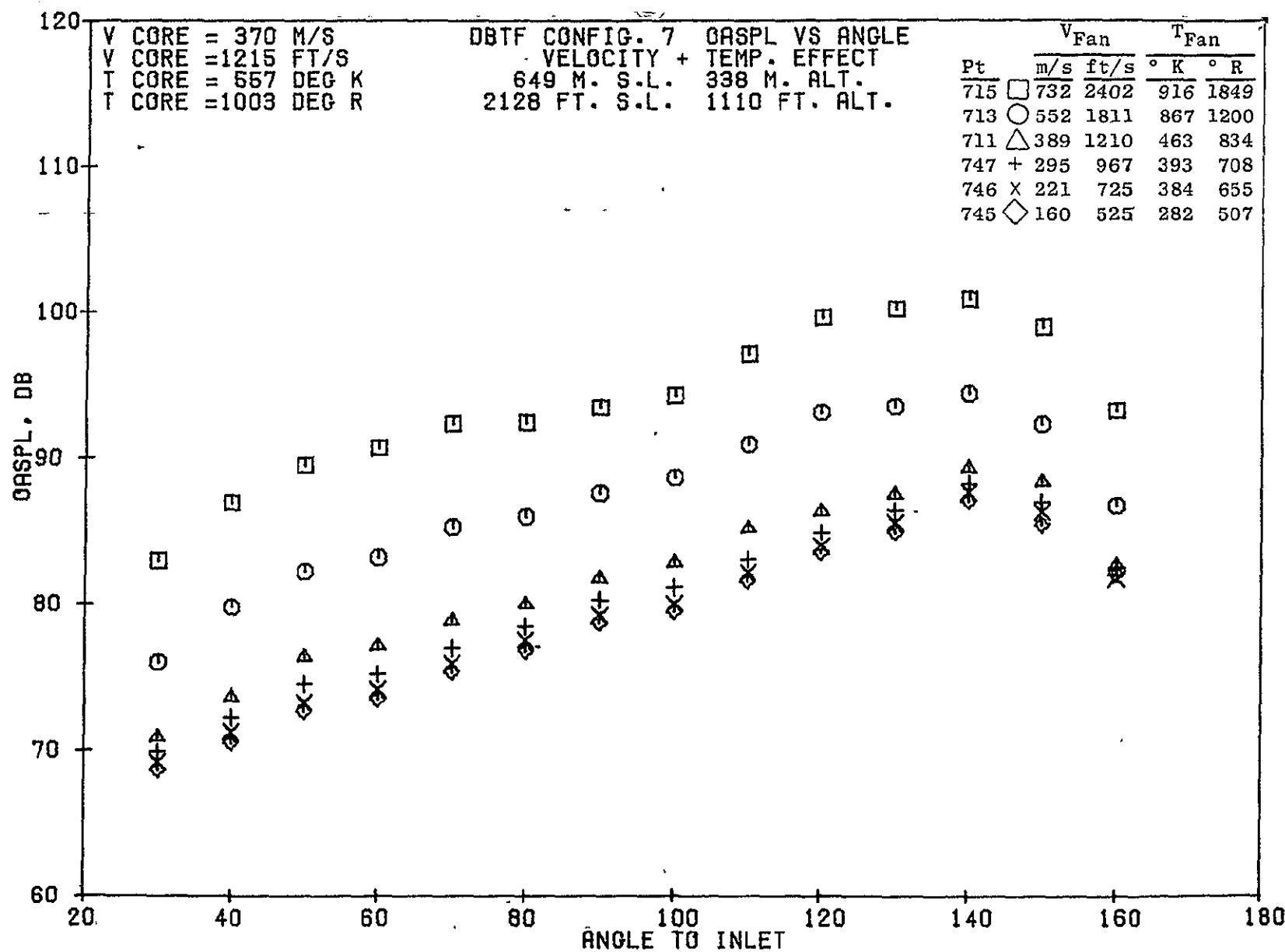
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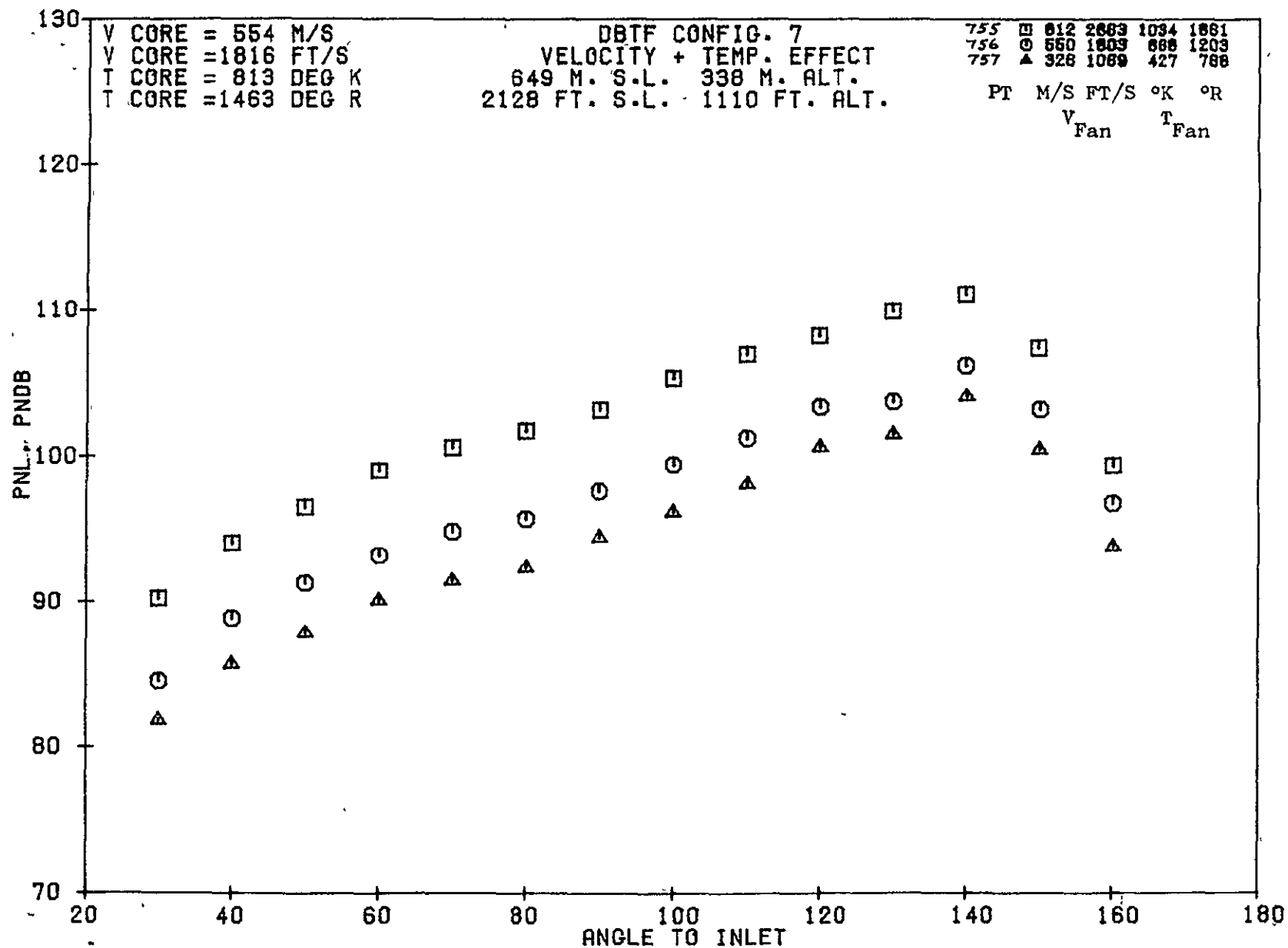


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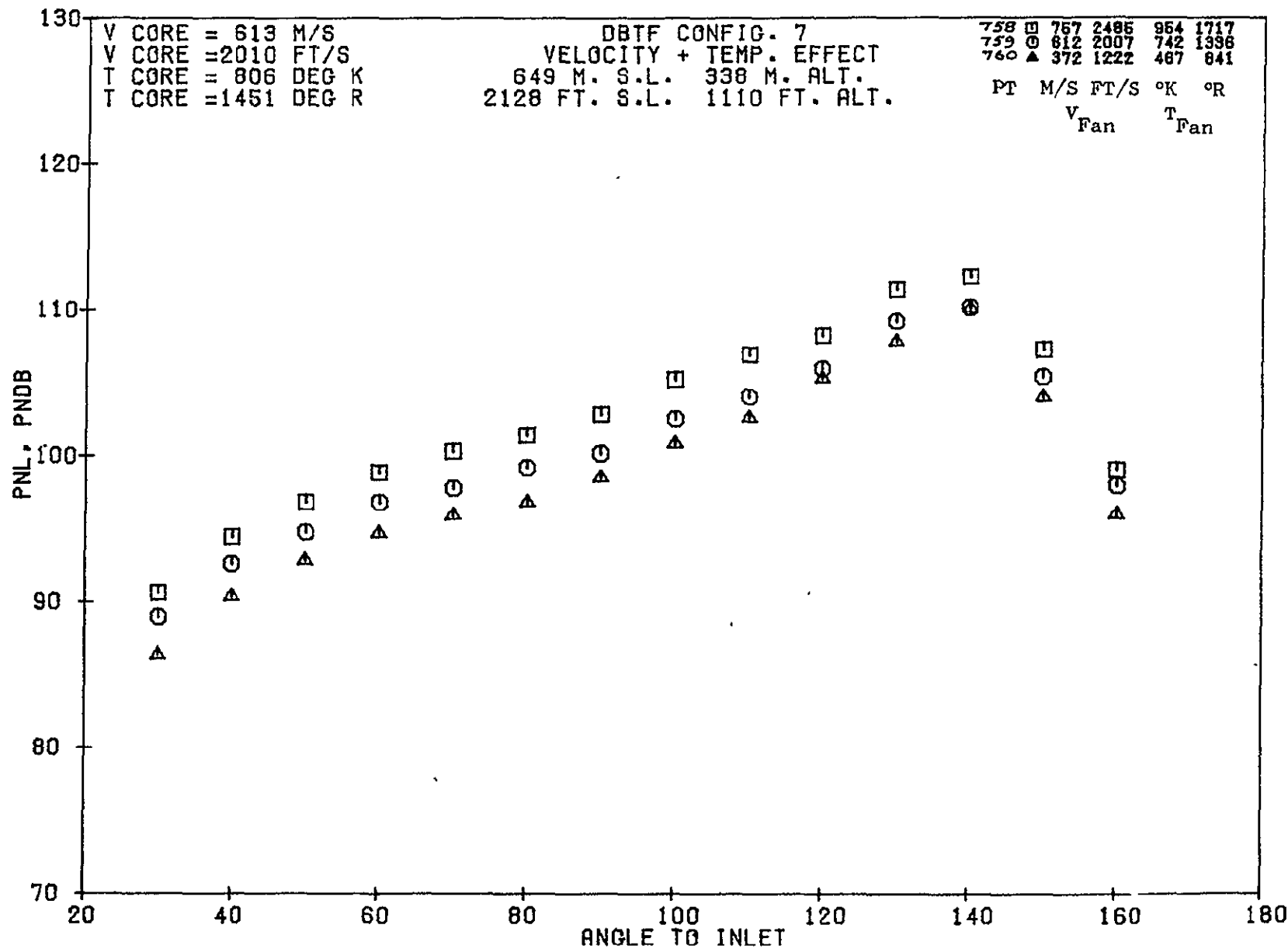
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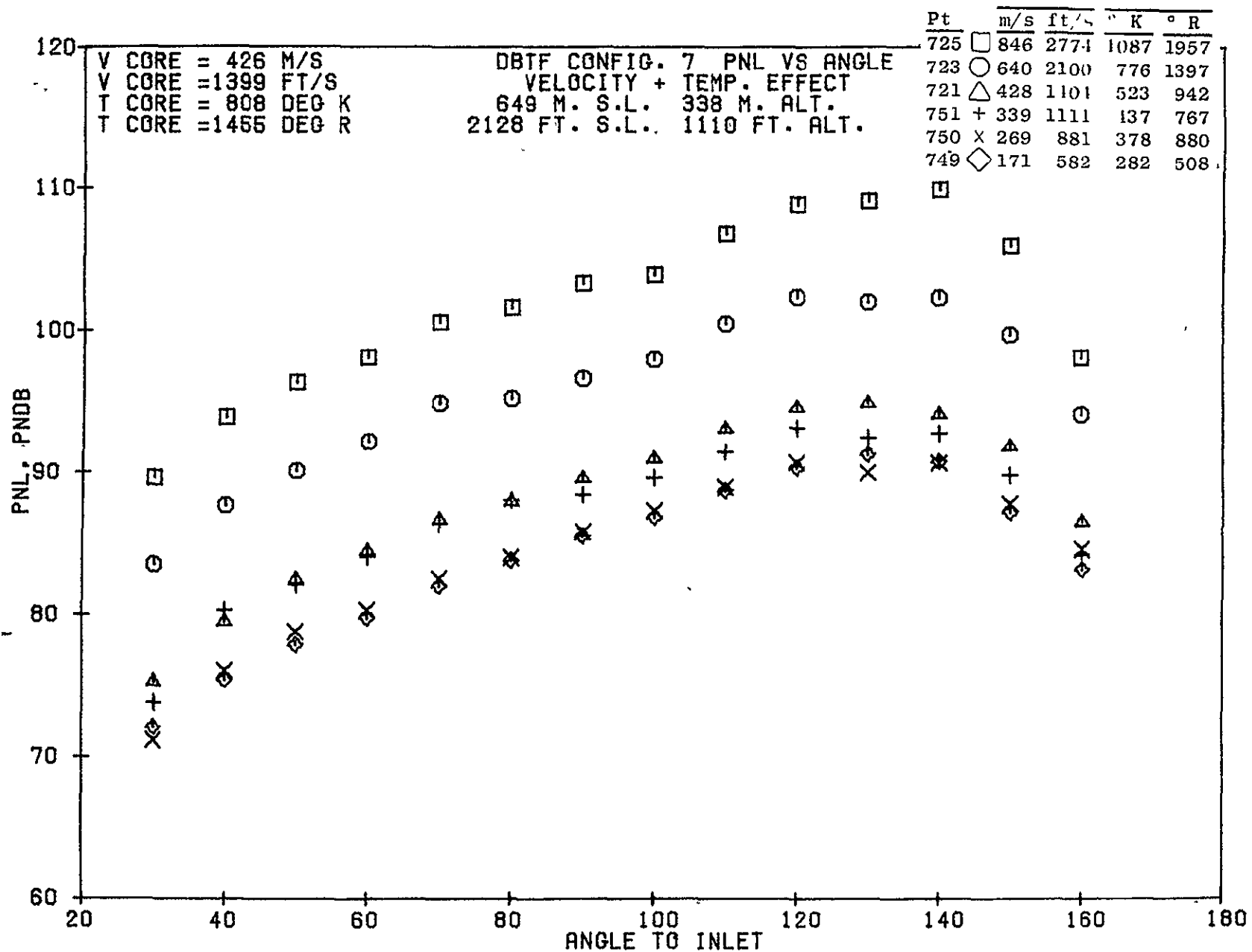


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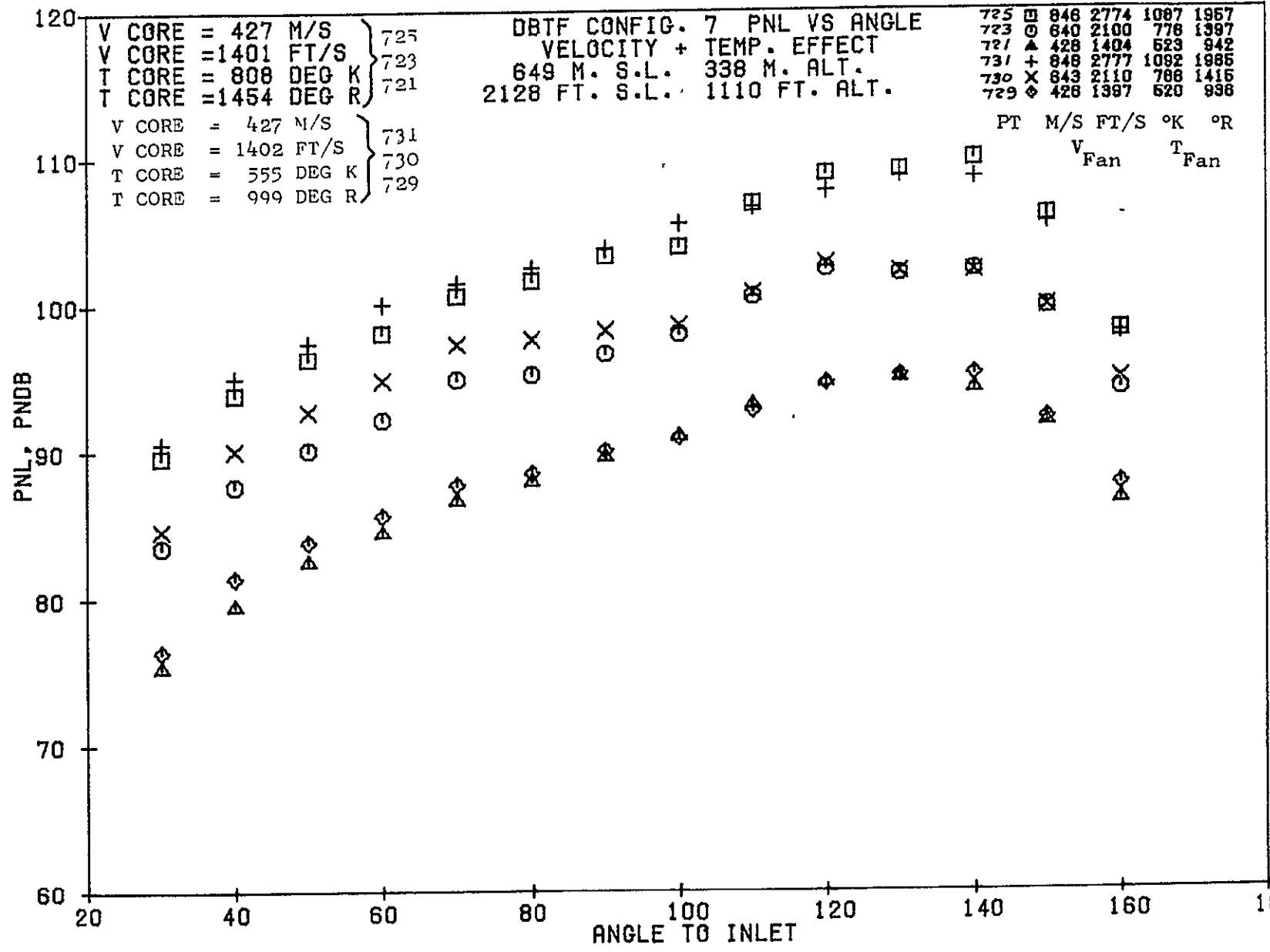
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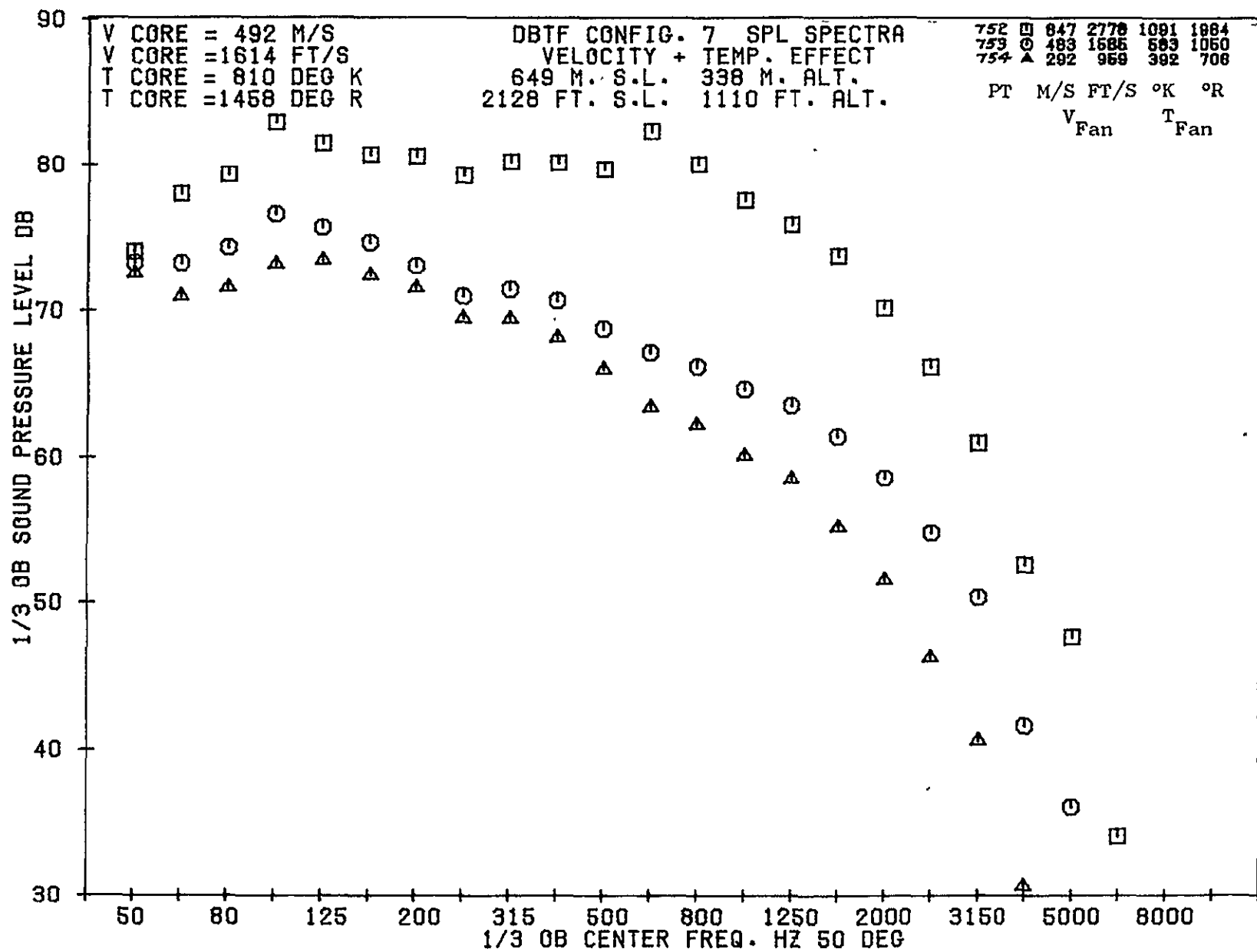
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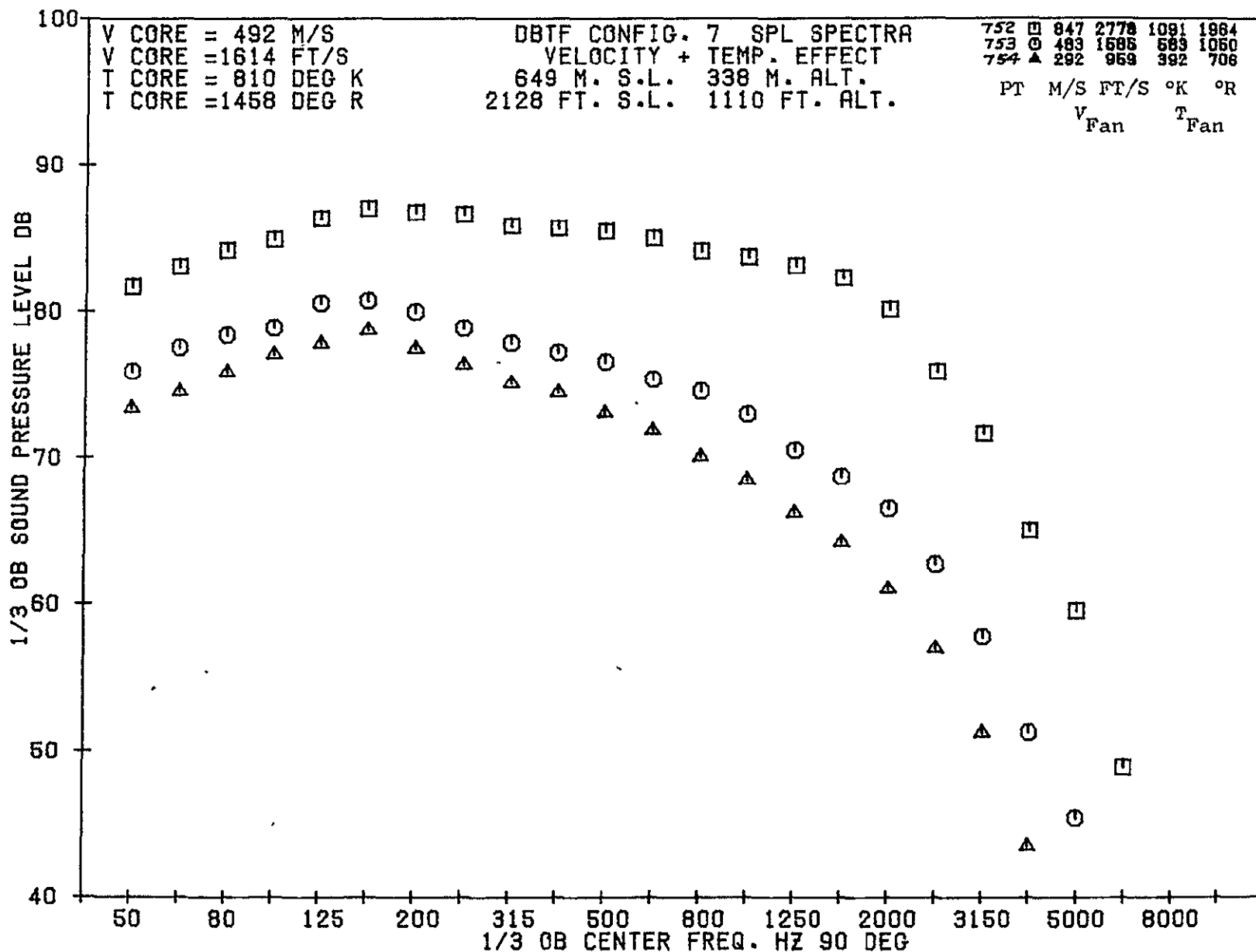
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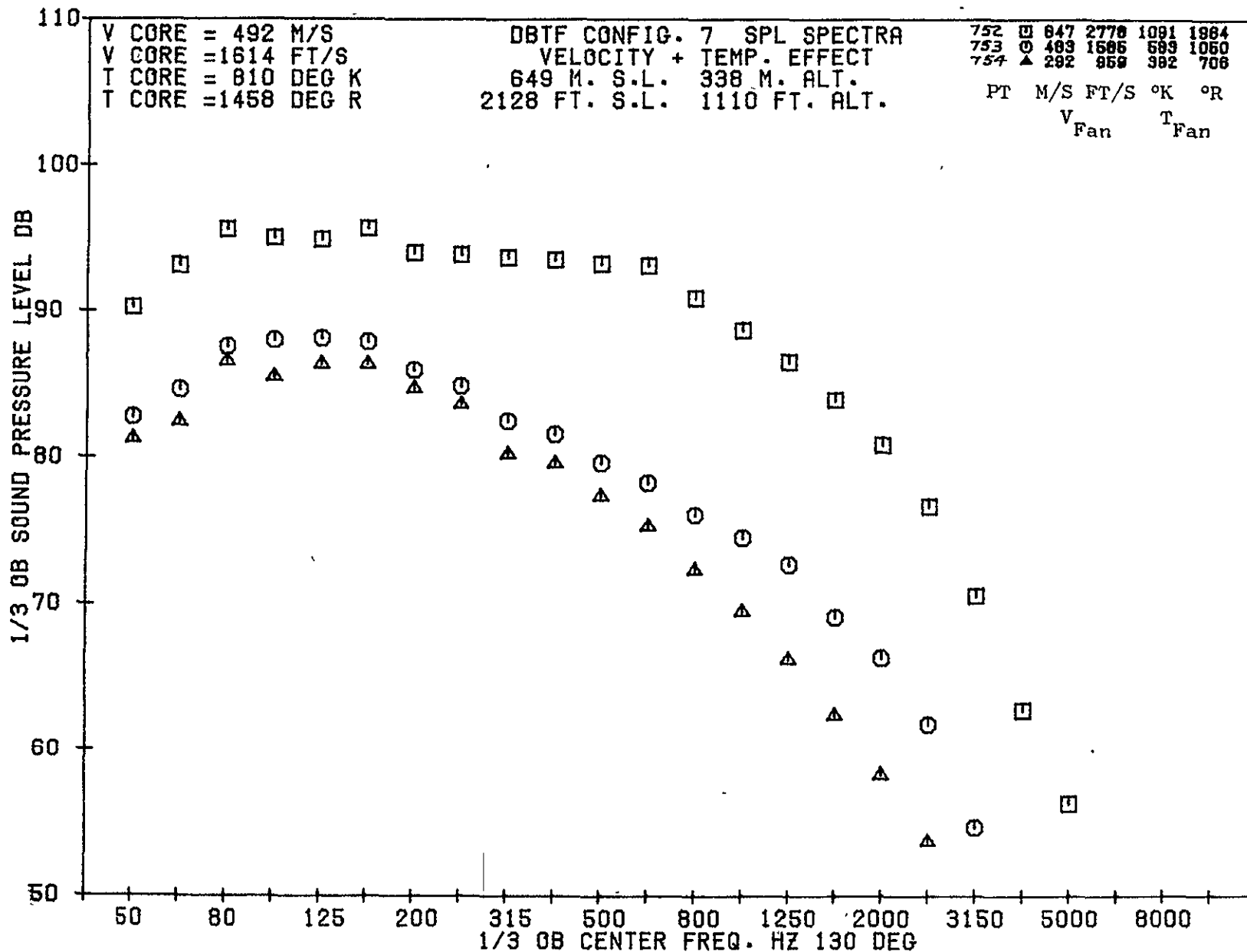
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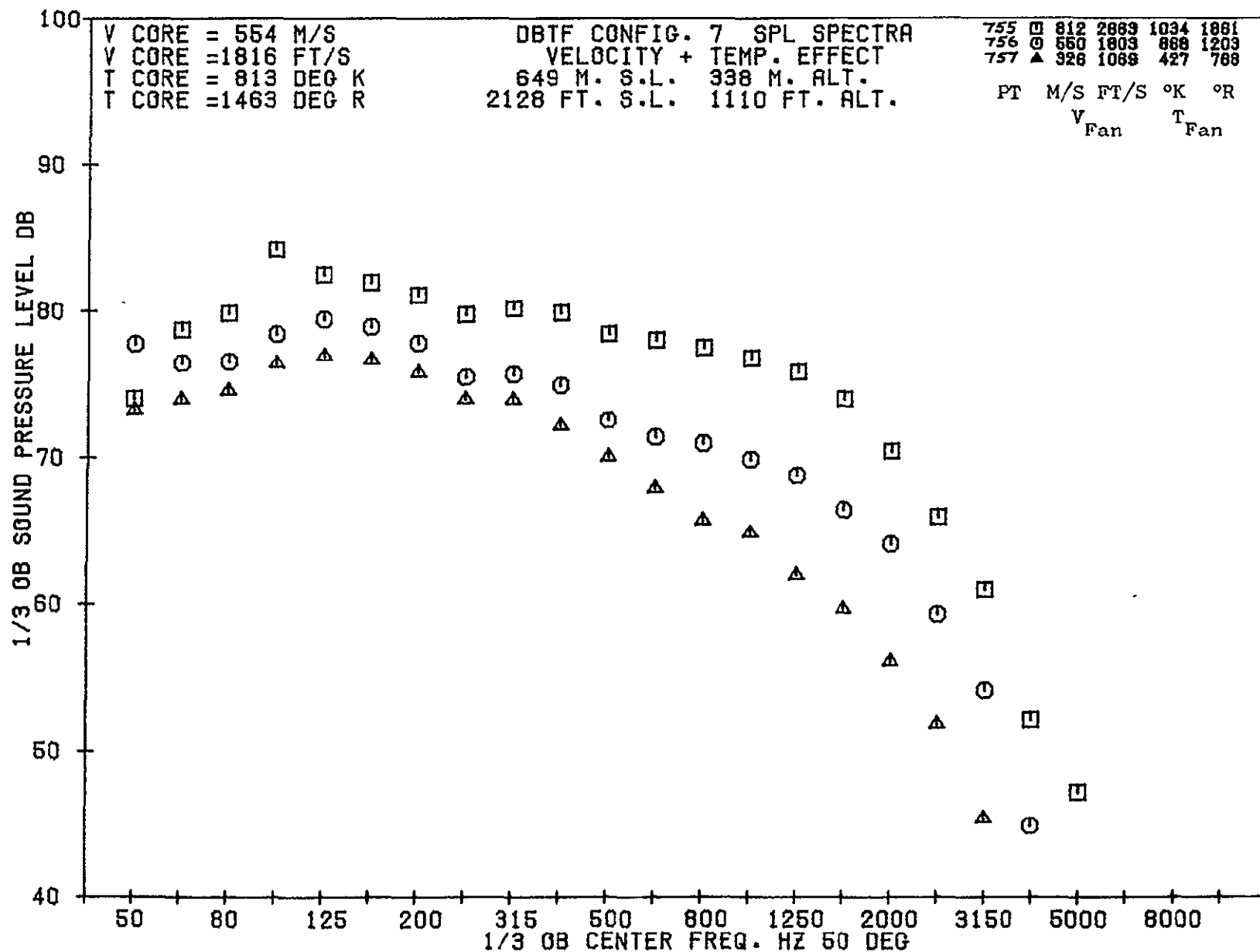
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4-306

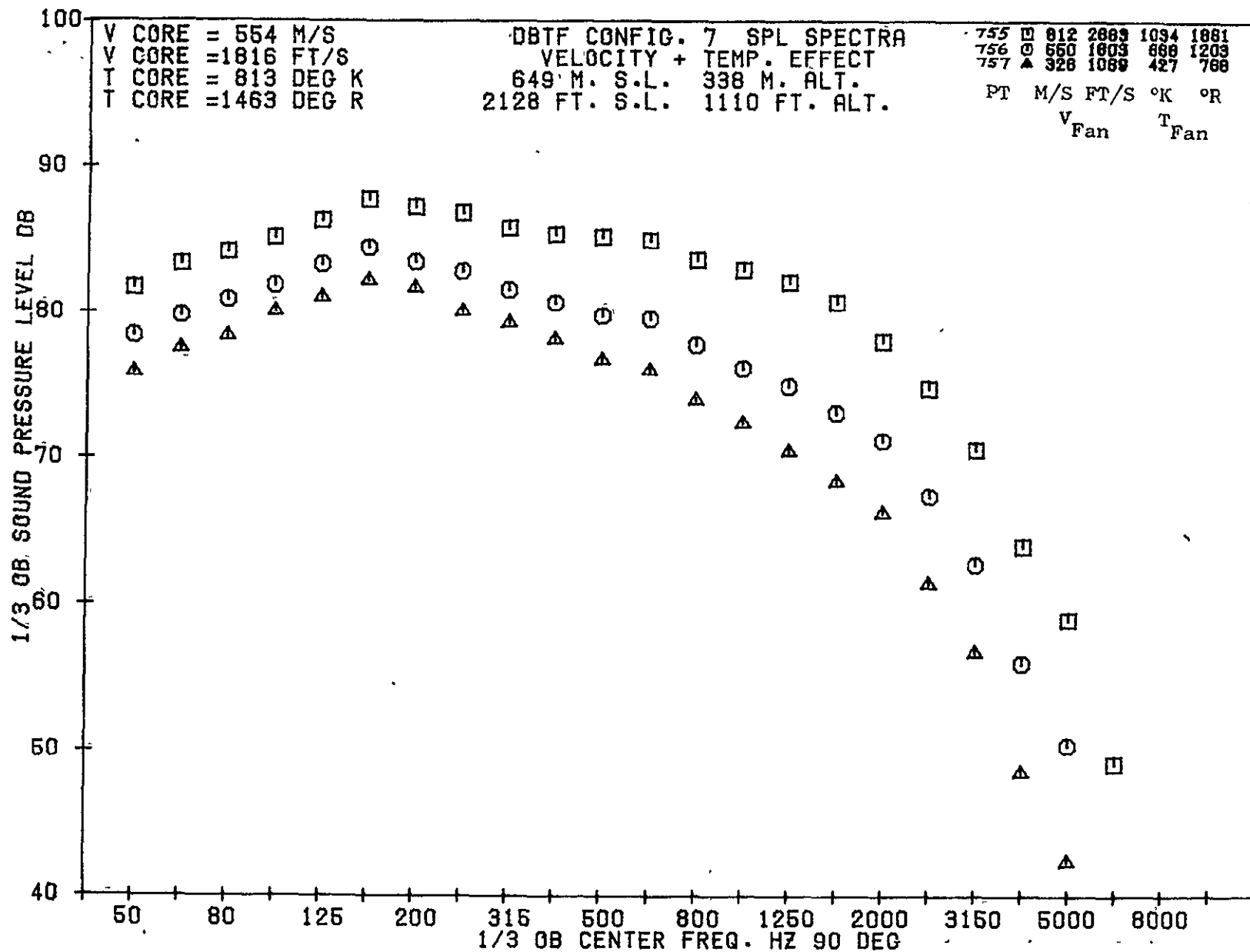


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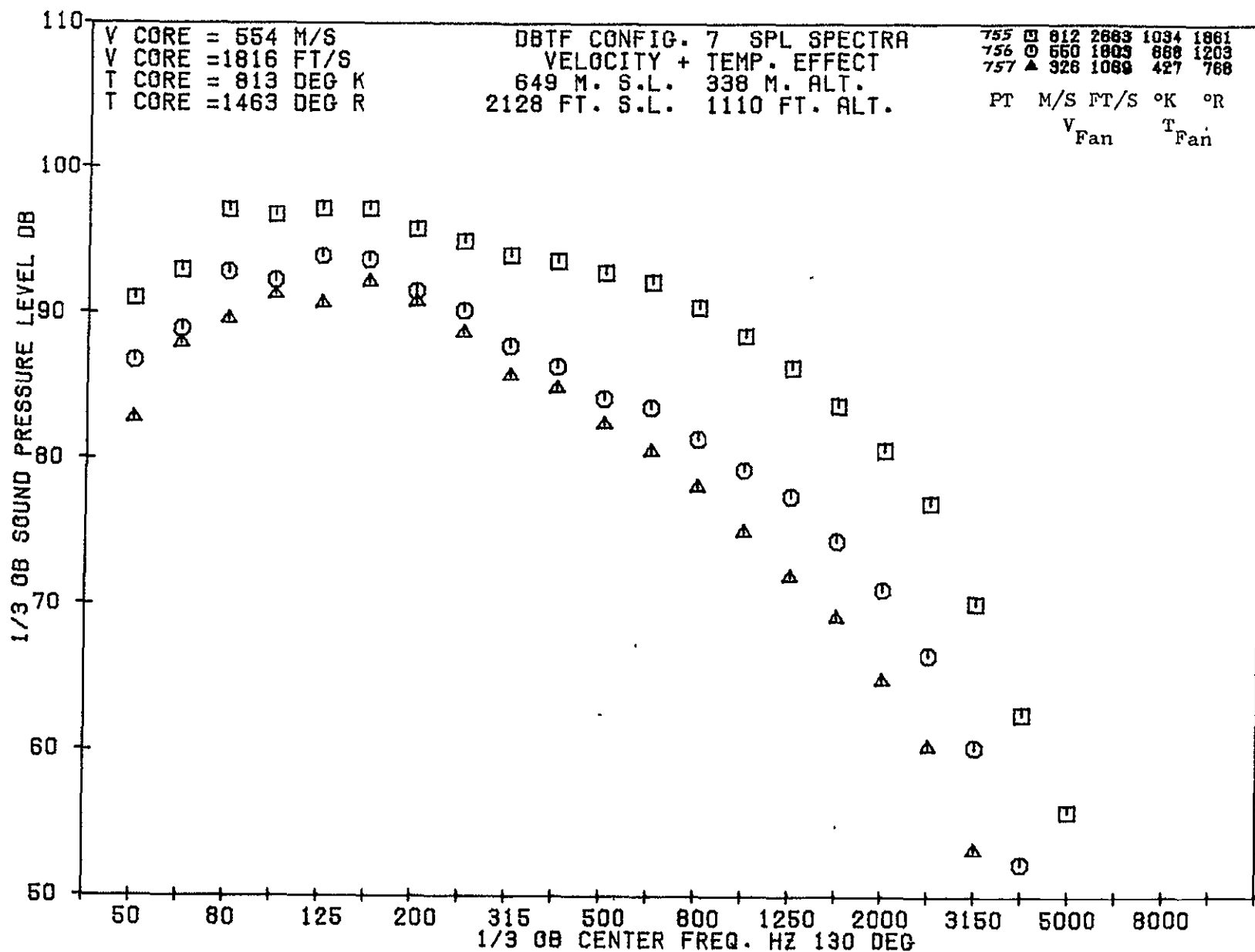
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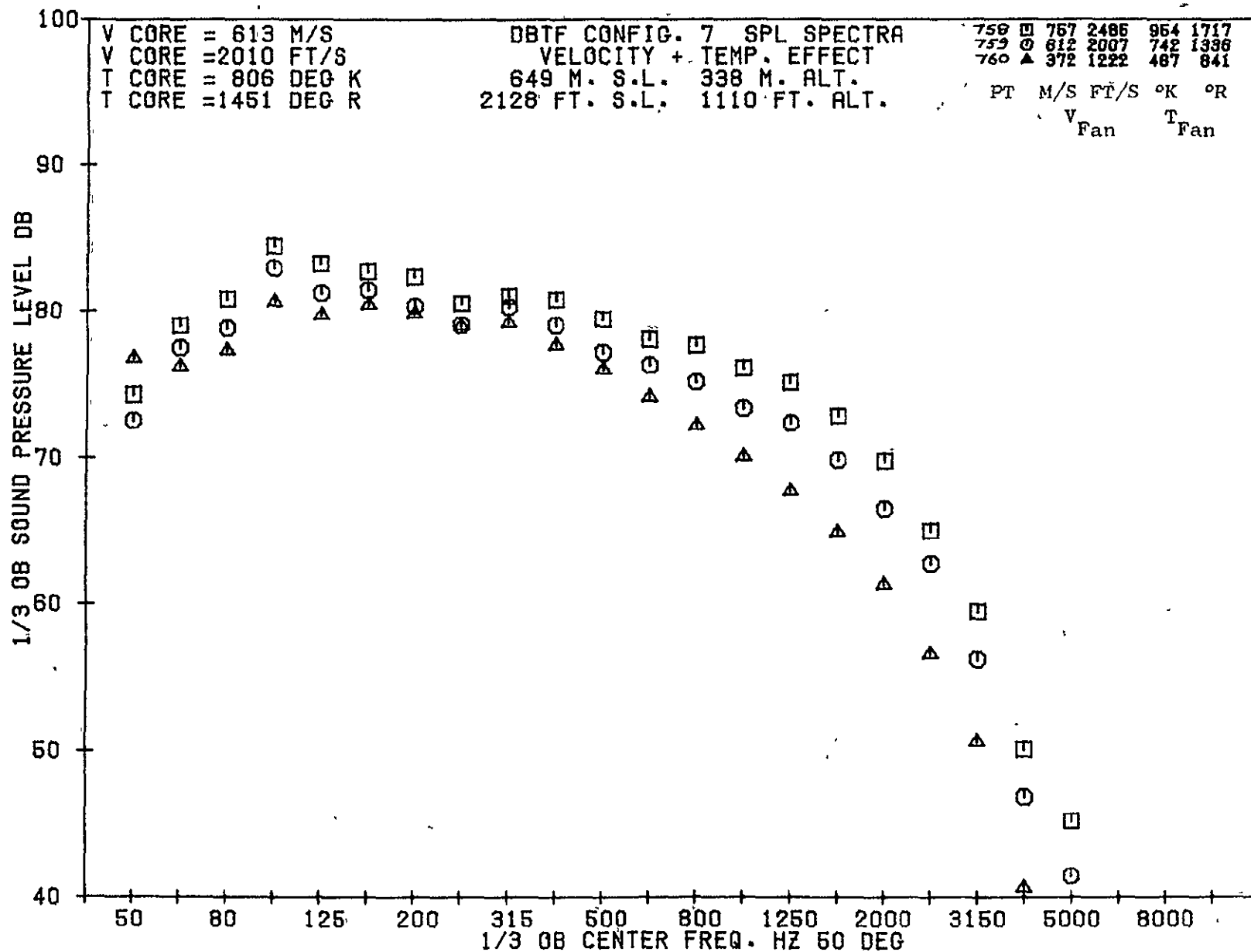


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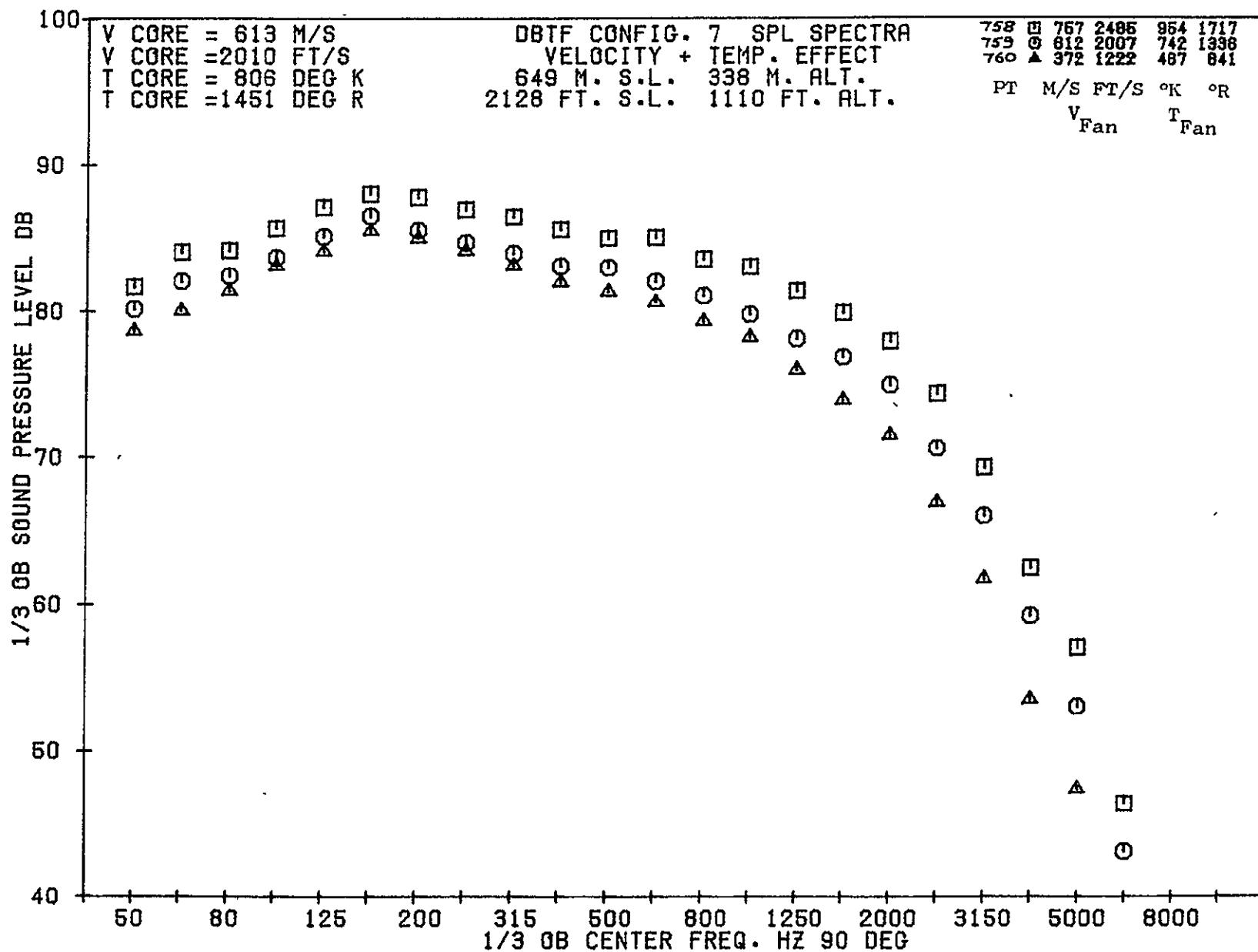
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79 BURCH A.



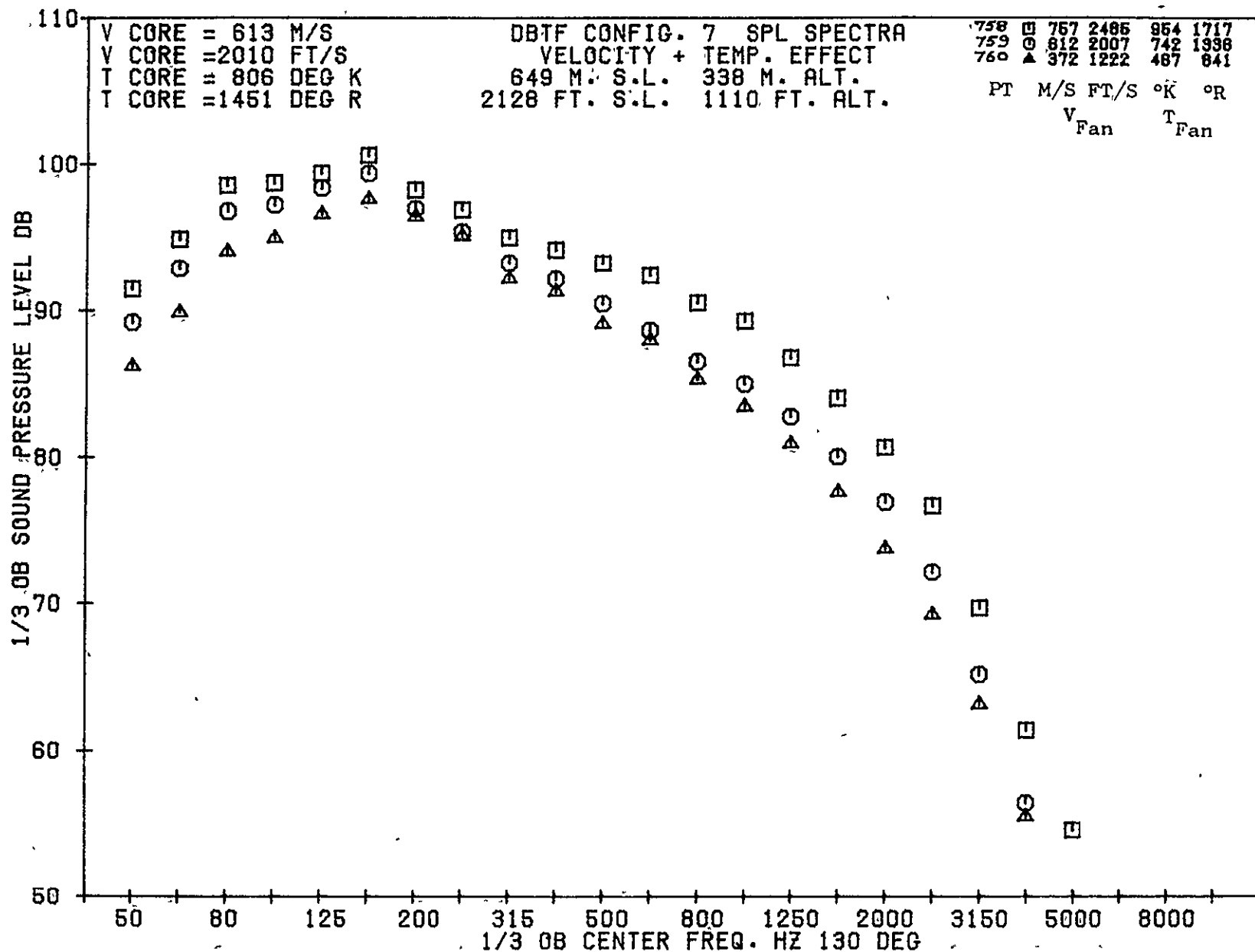
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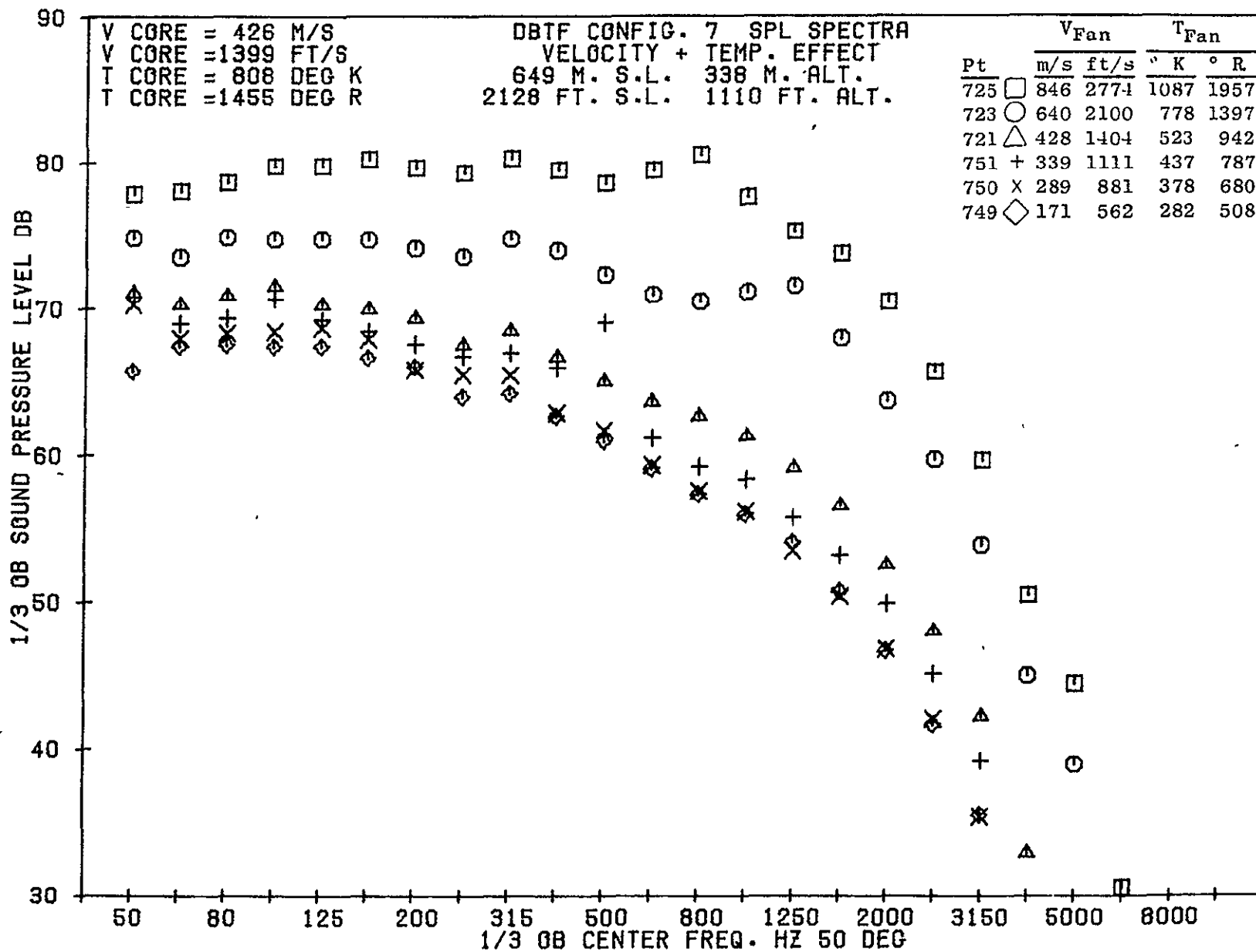
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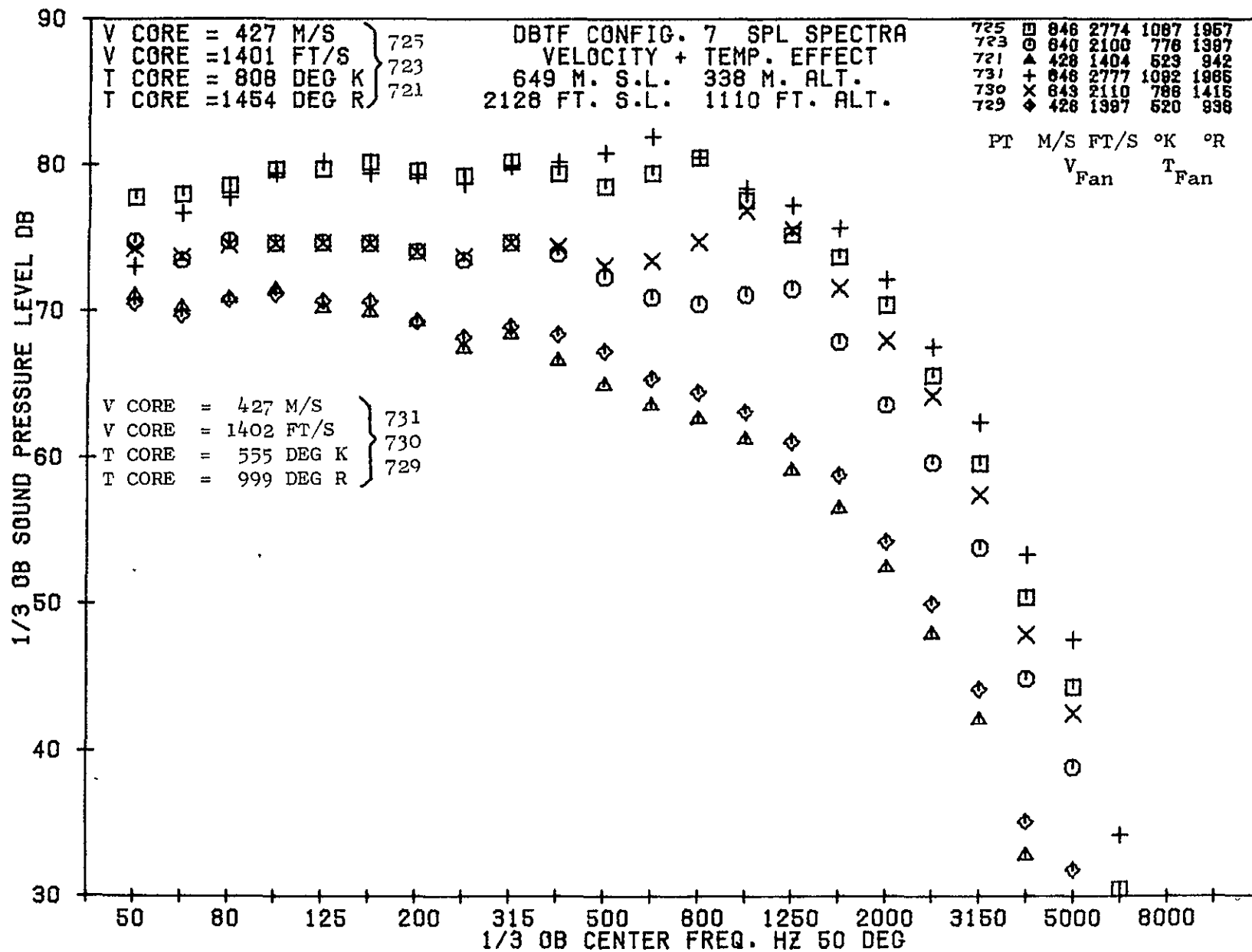


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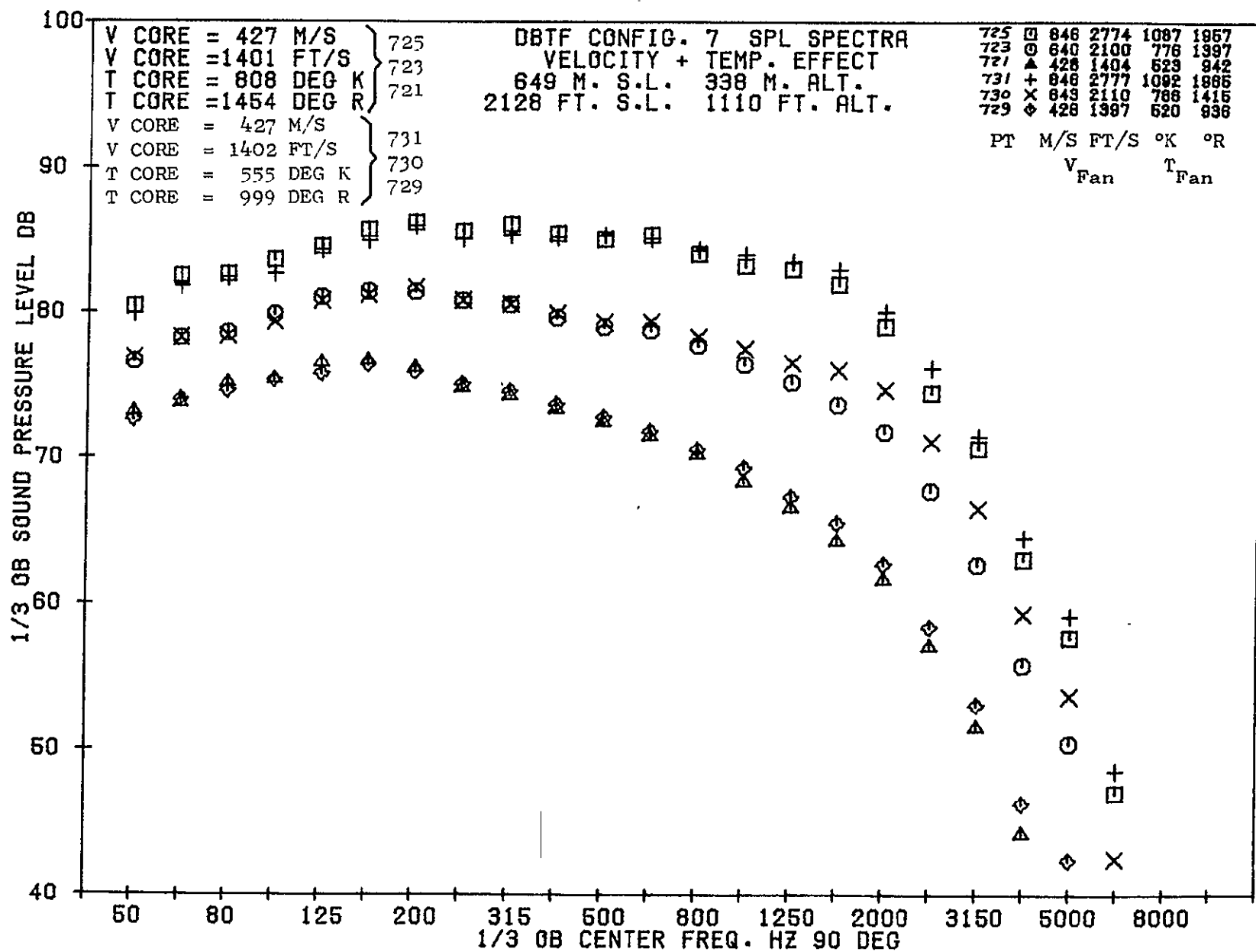
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1550



08/19/75
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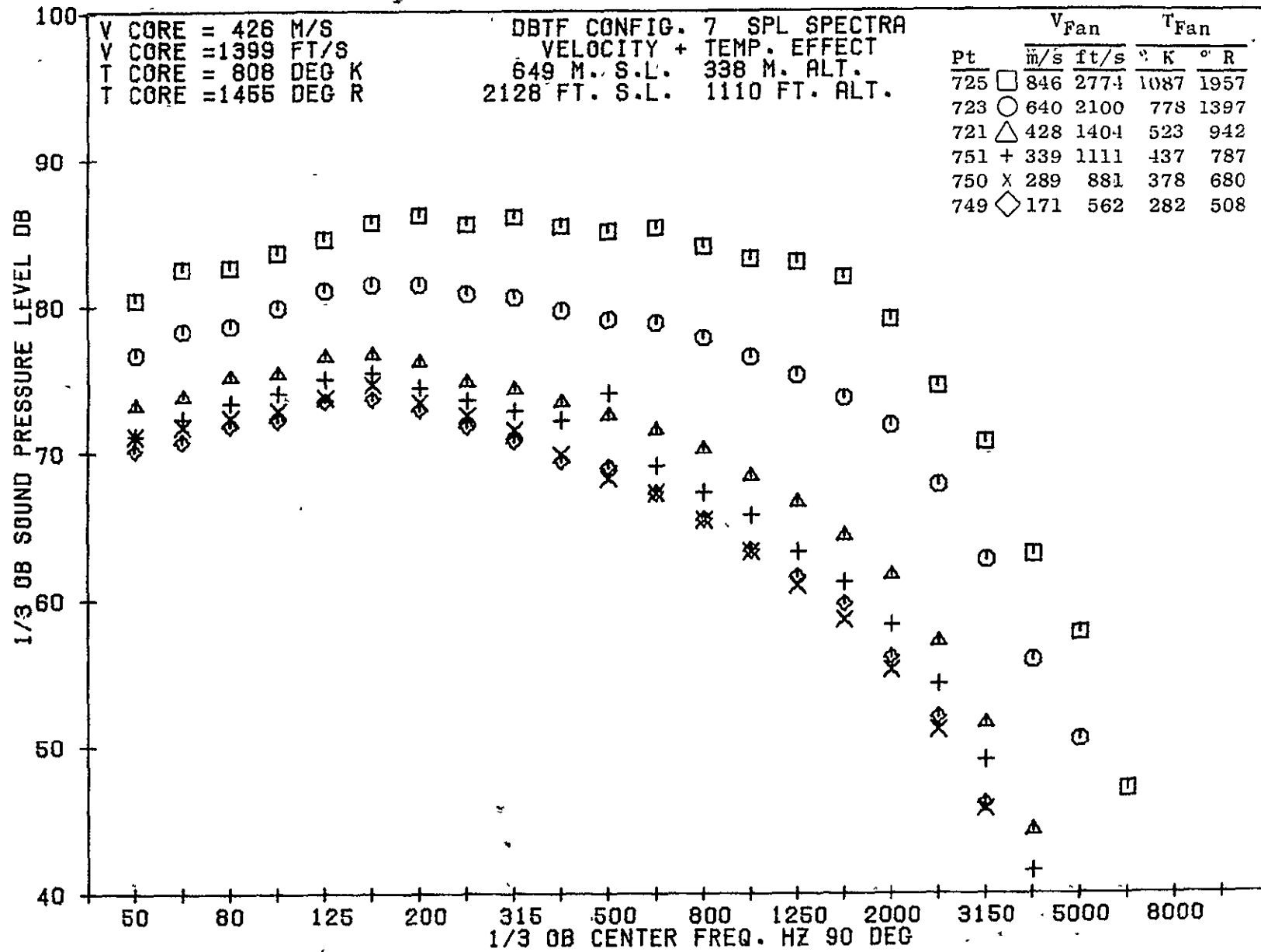
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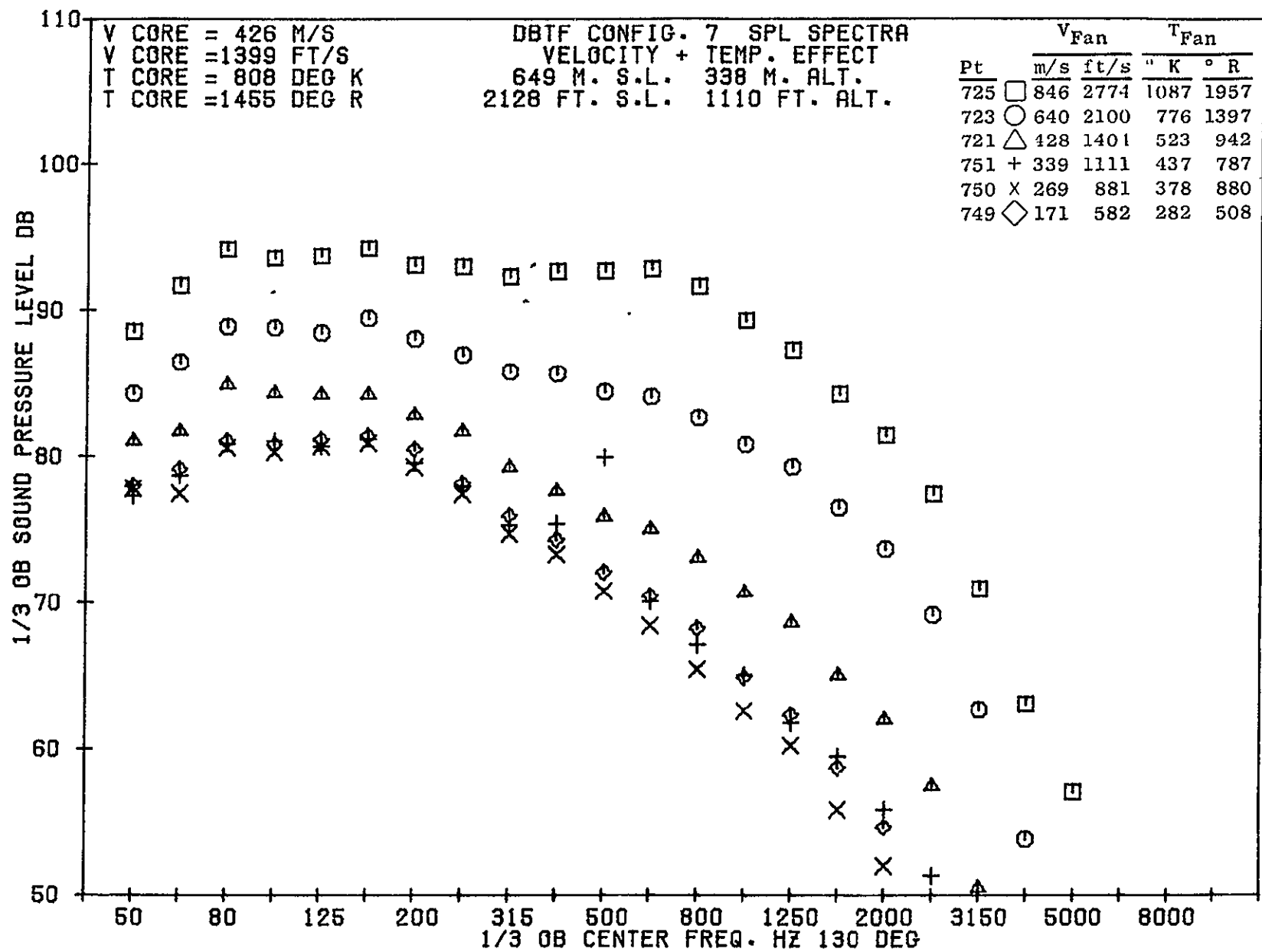
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4-2/0

1552

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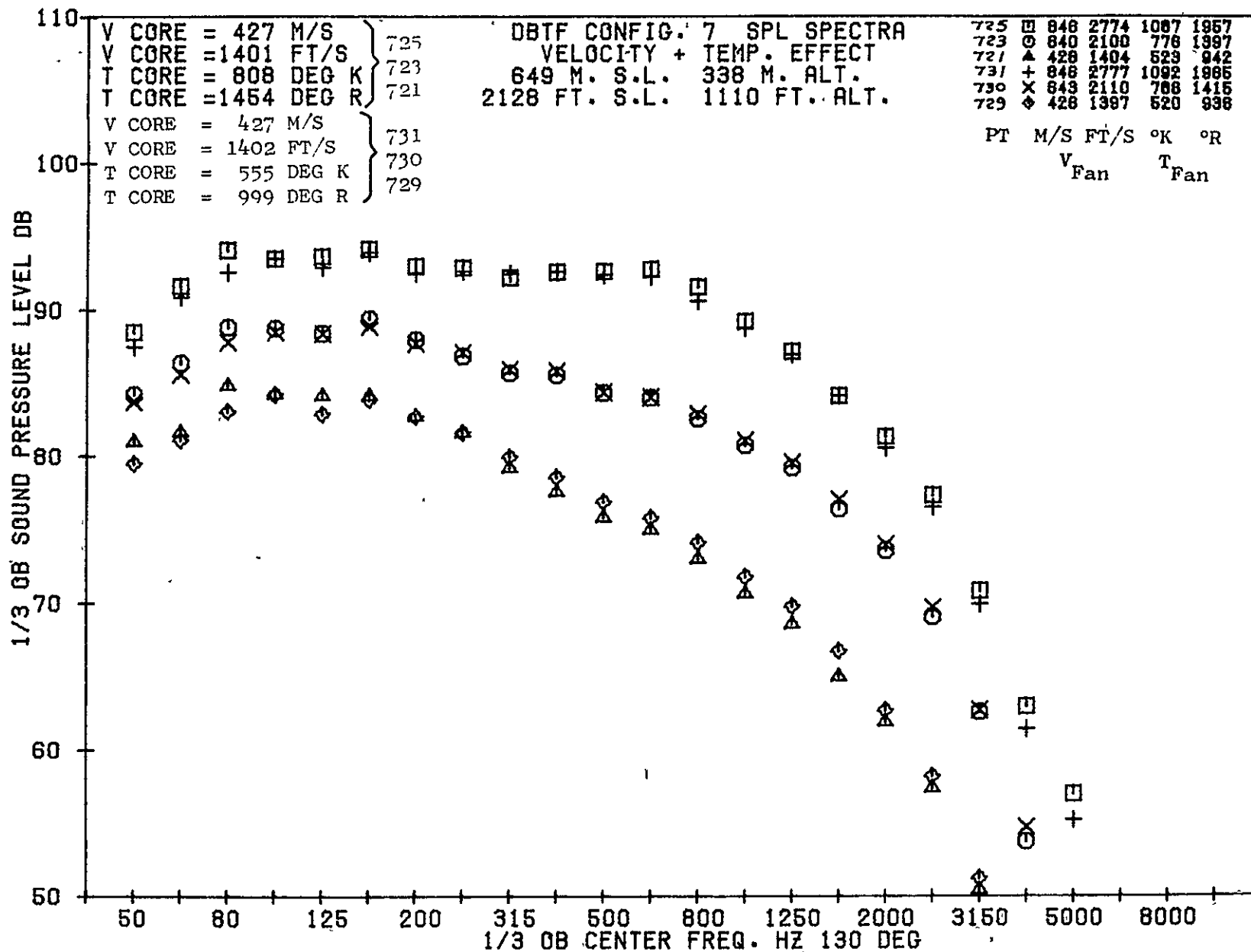
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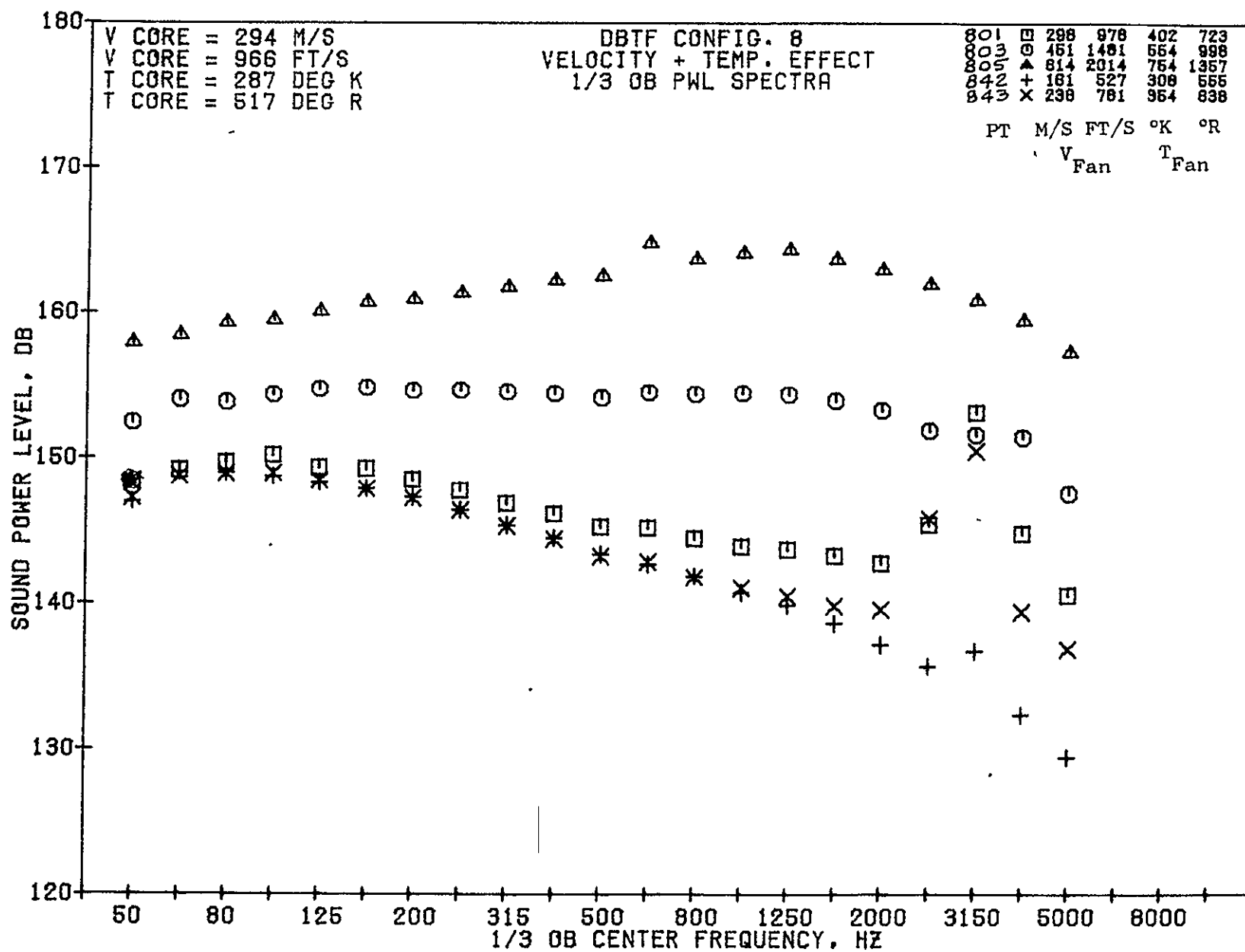
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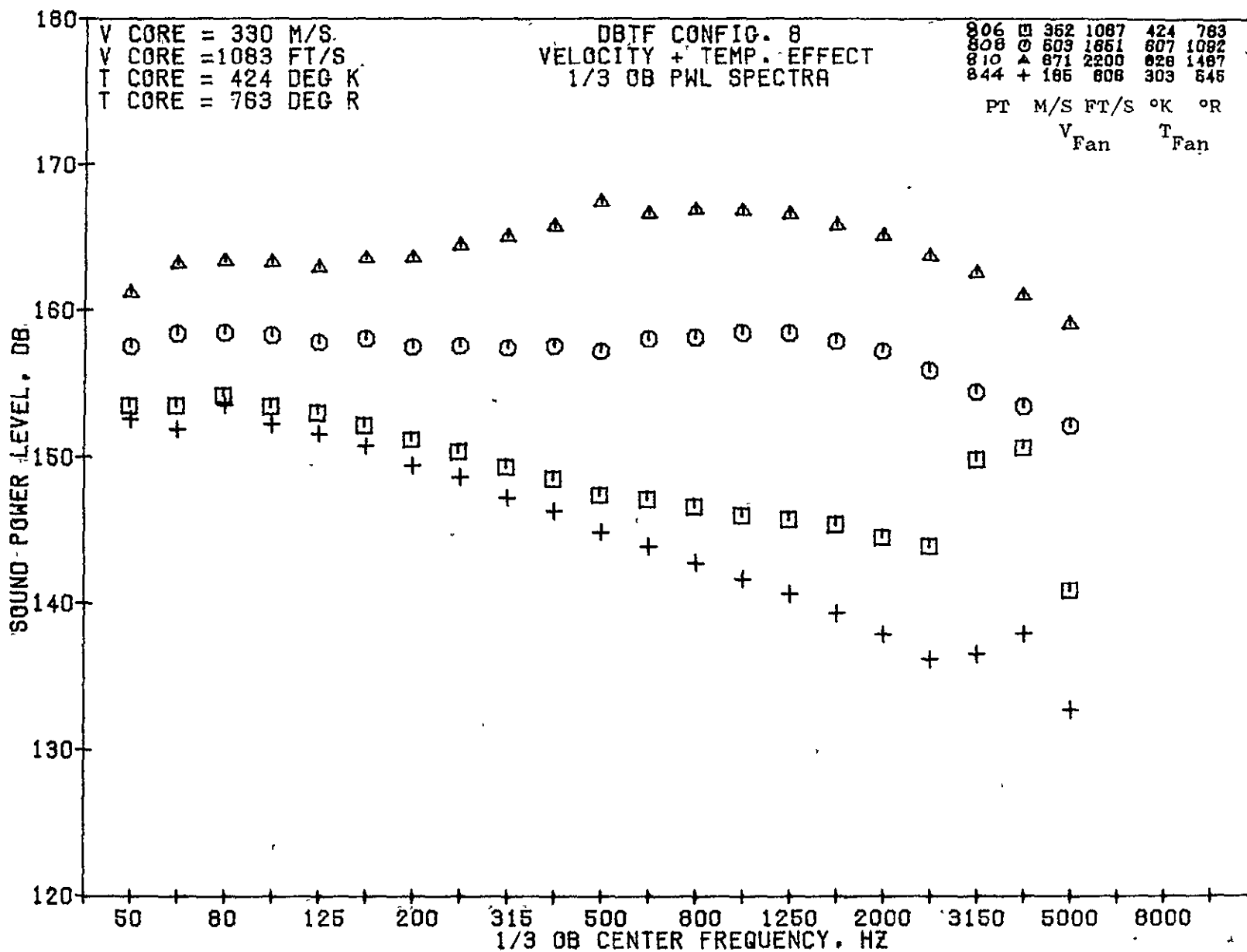
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1555

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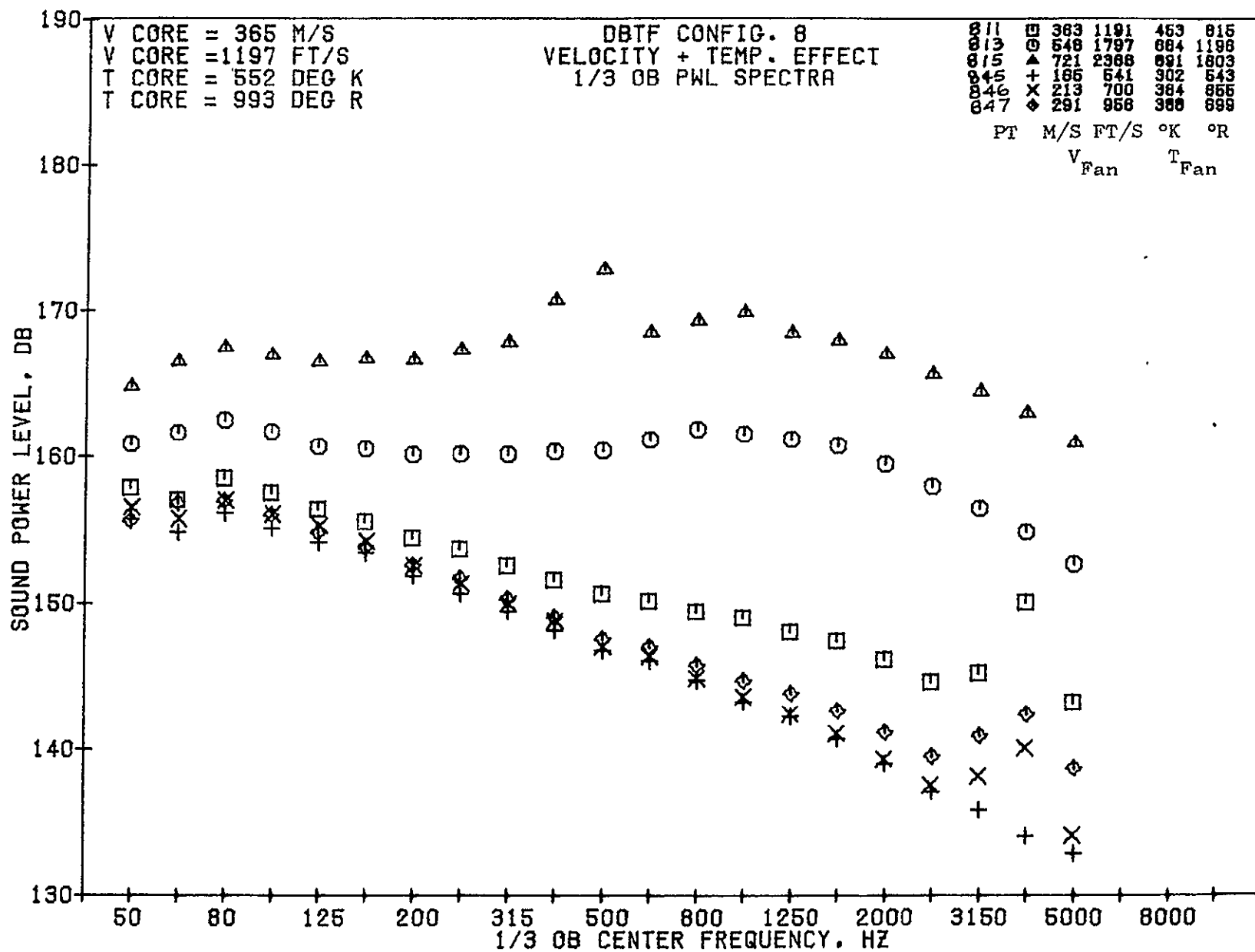
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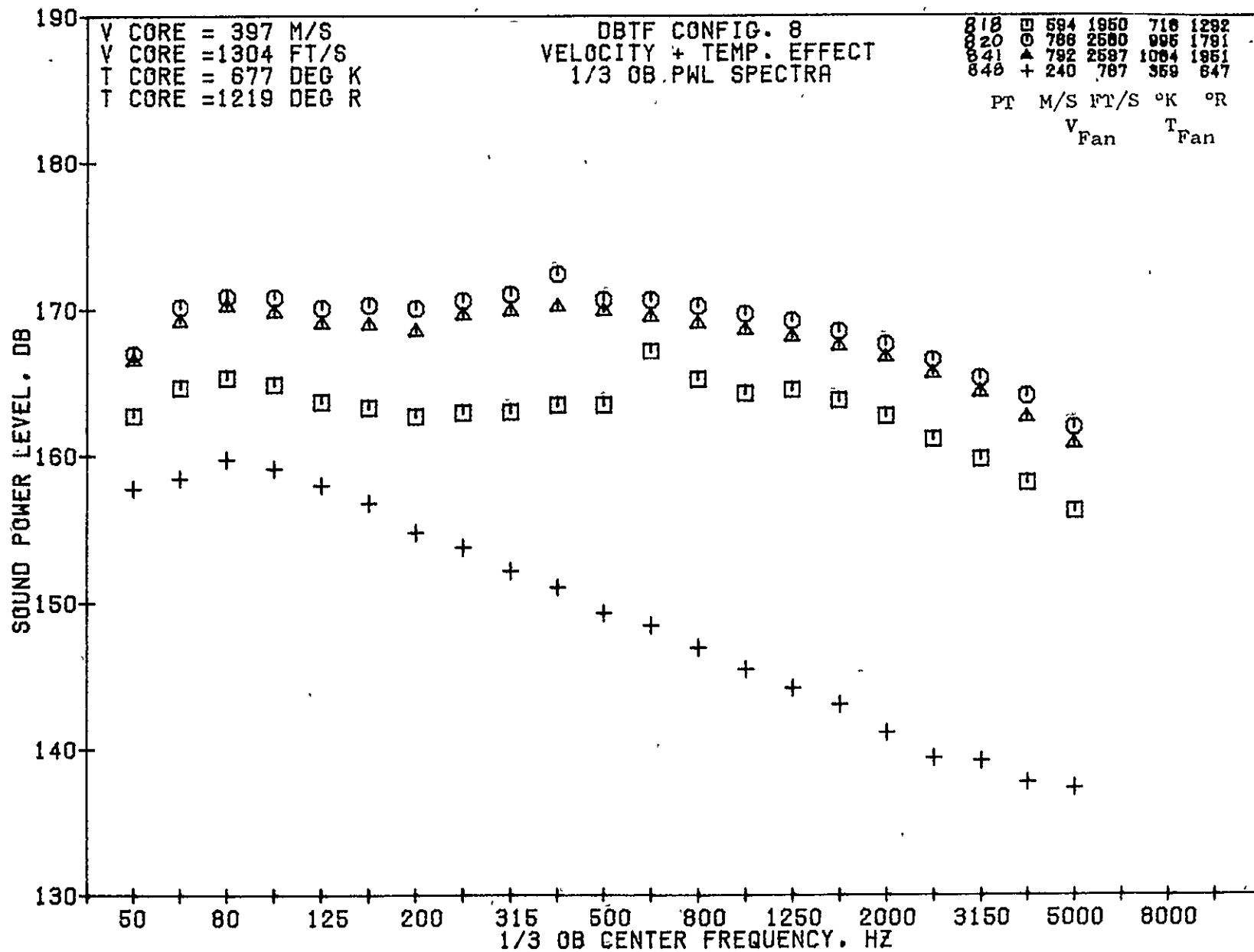
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1557

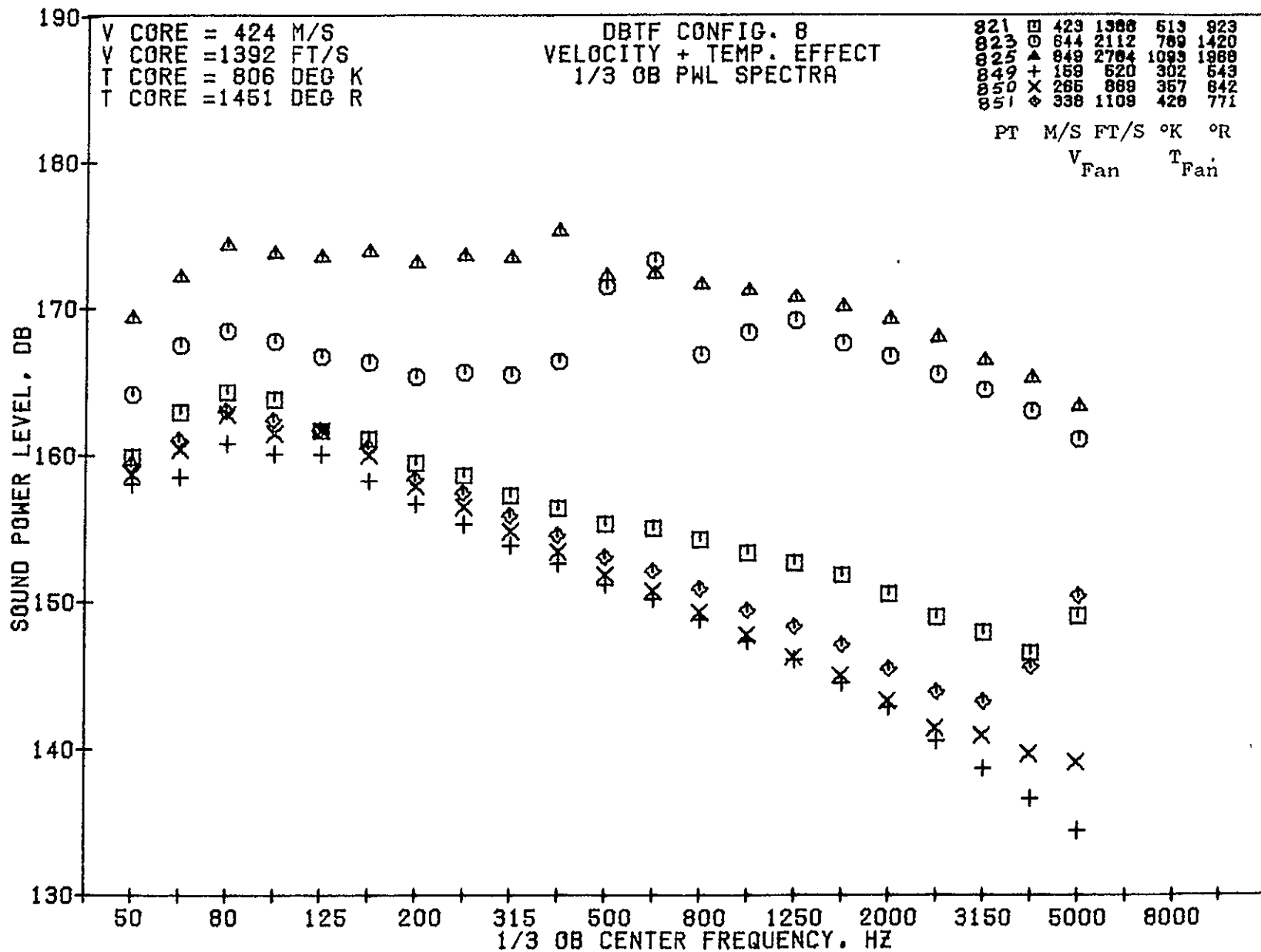
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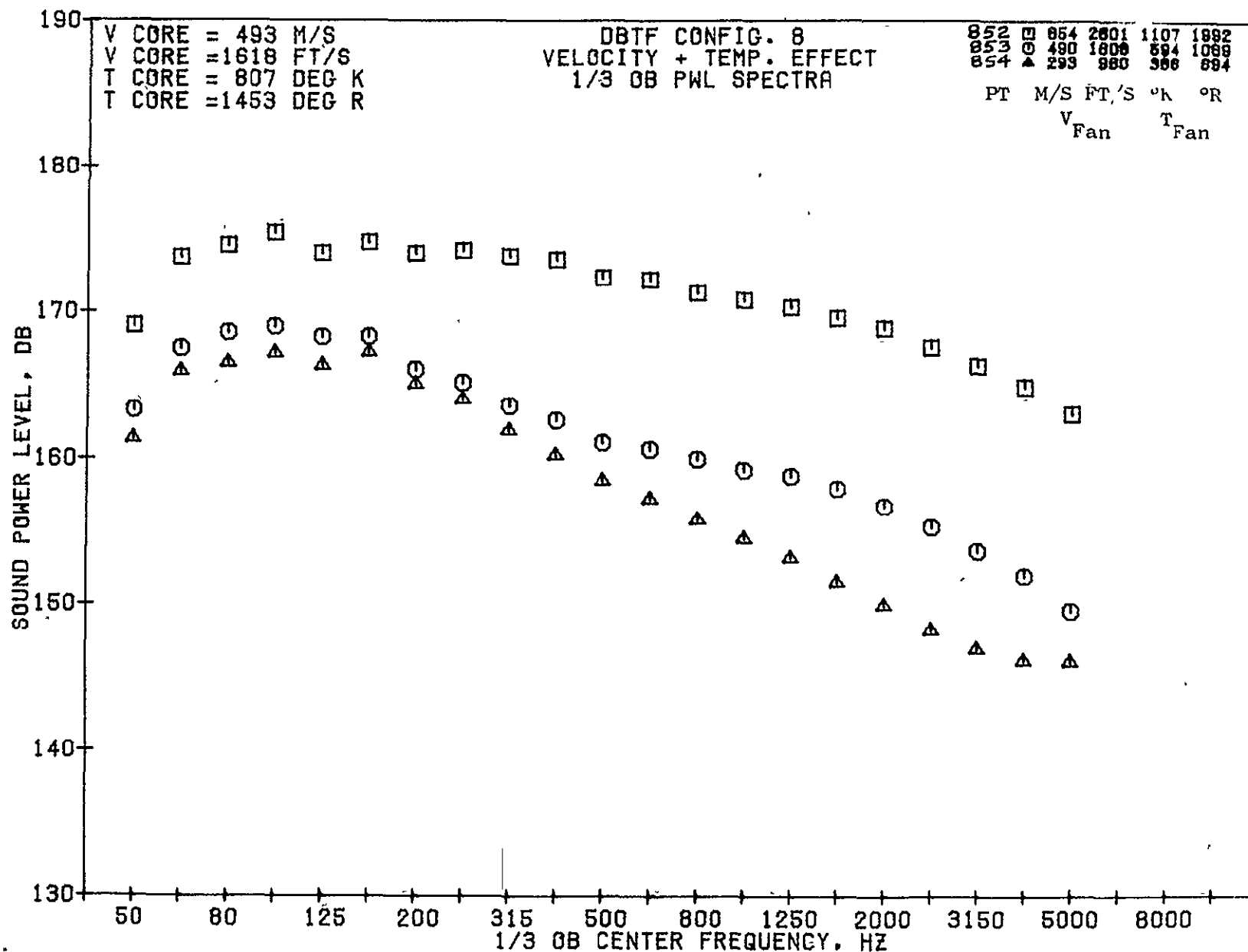
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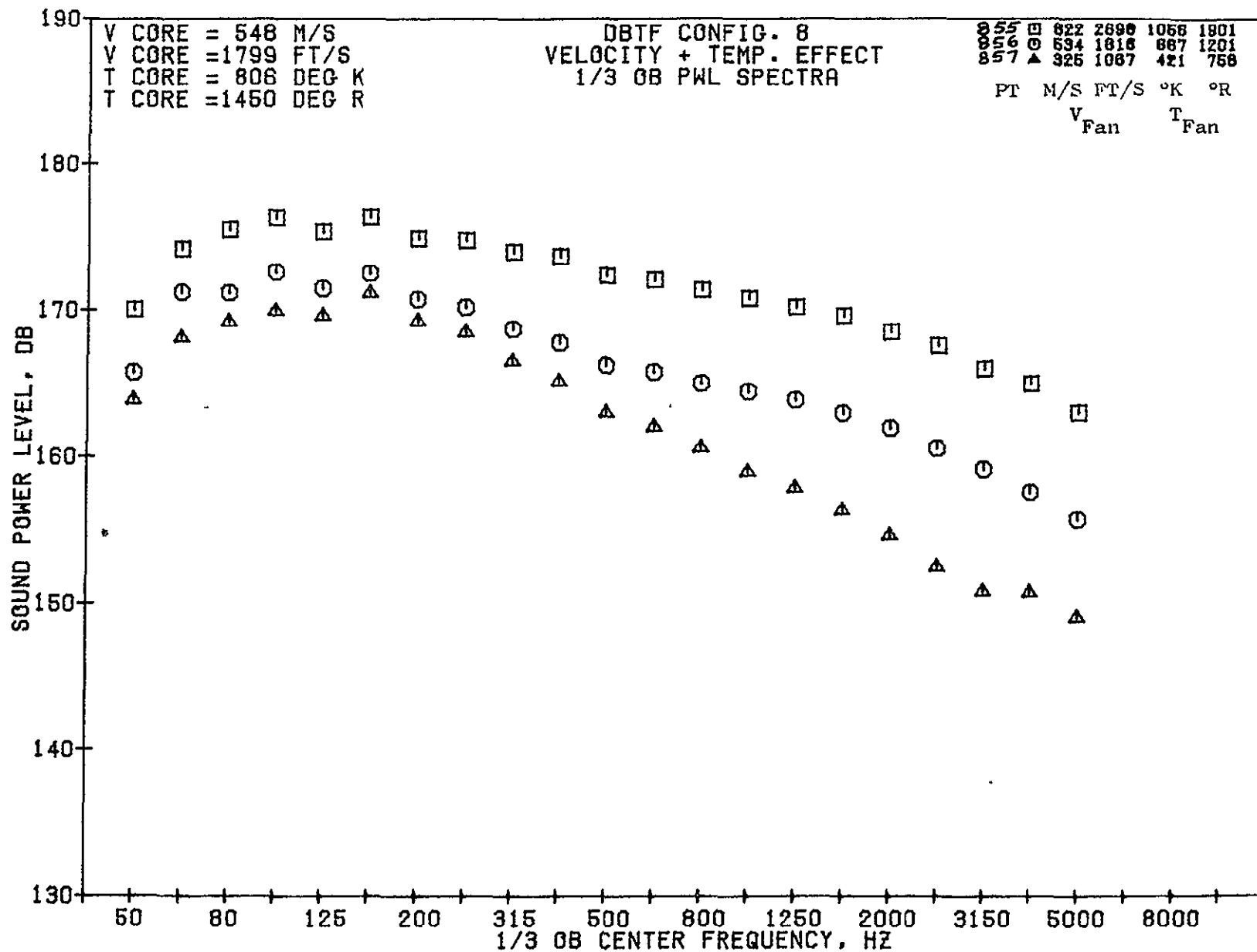
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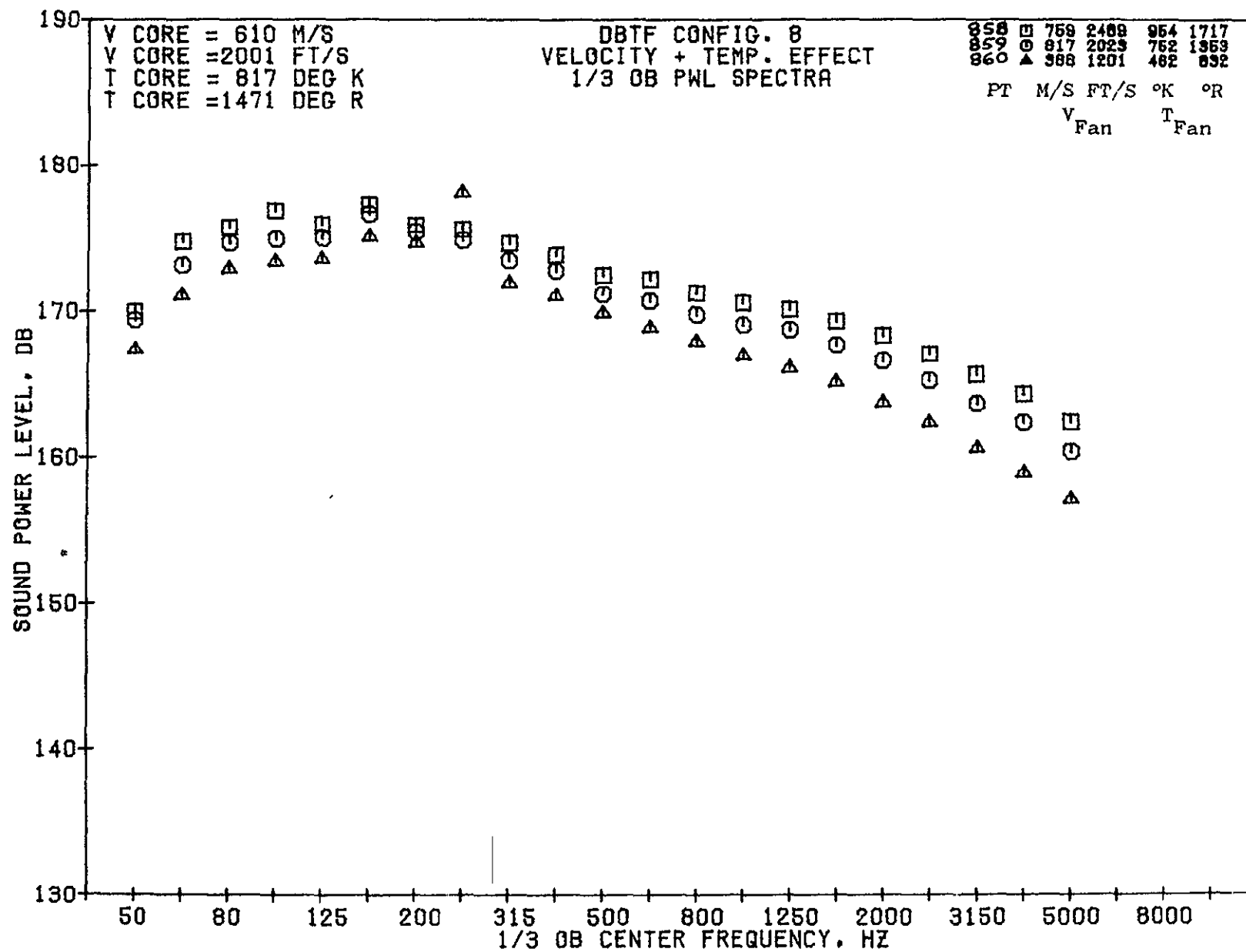


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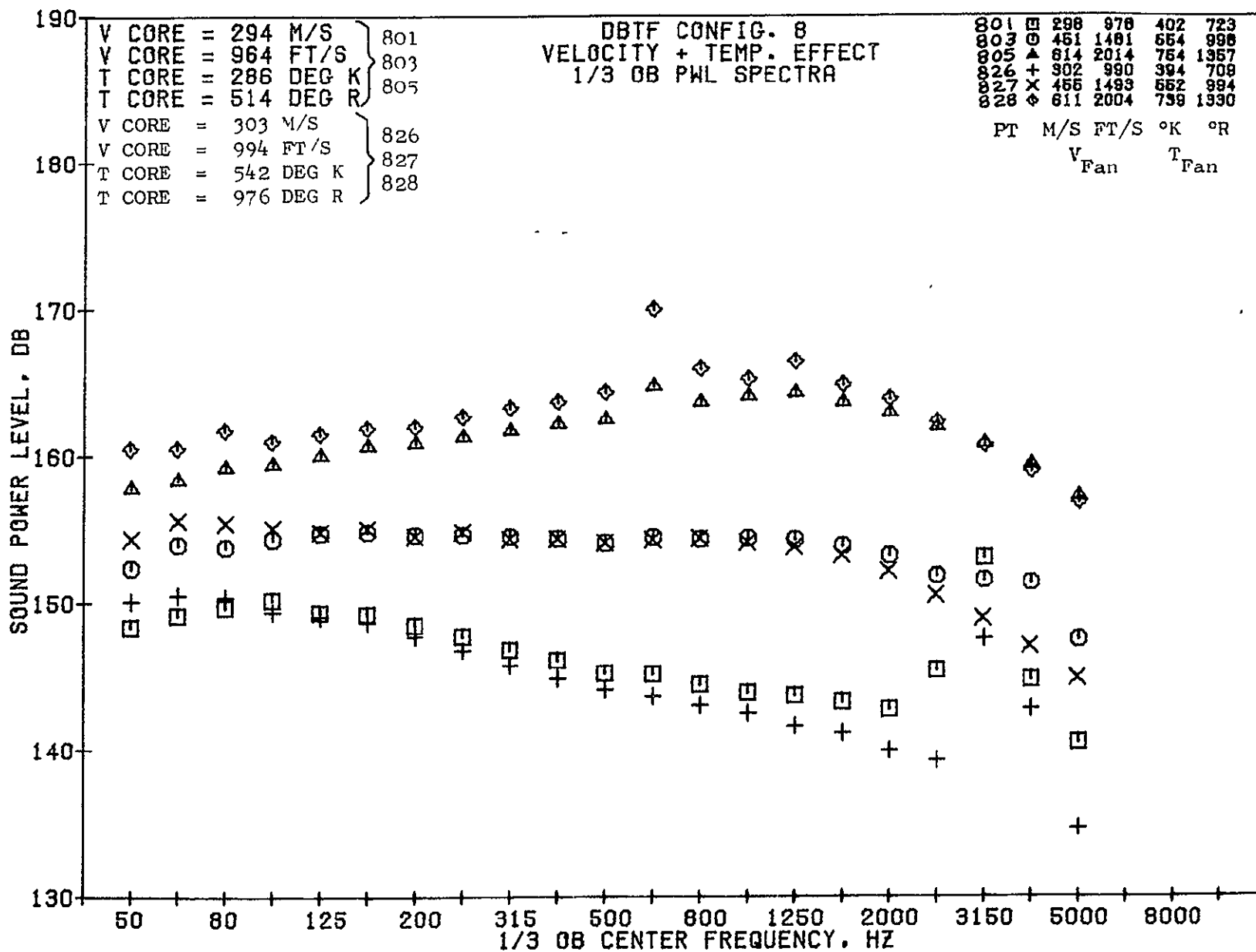
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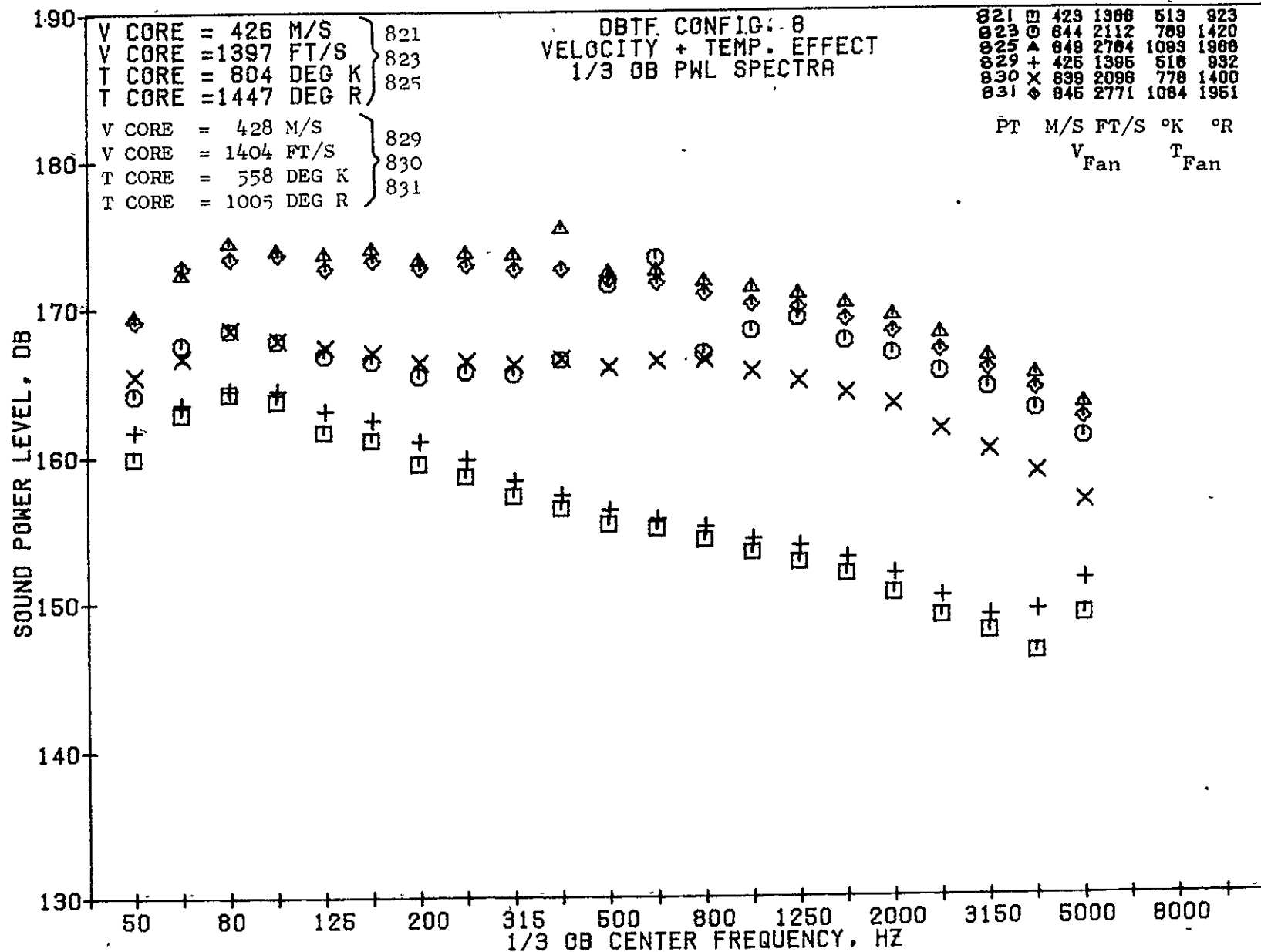
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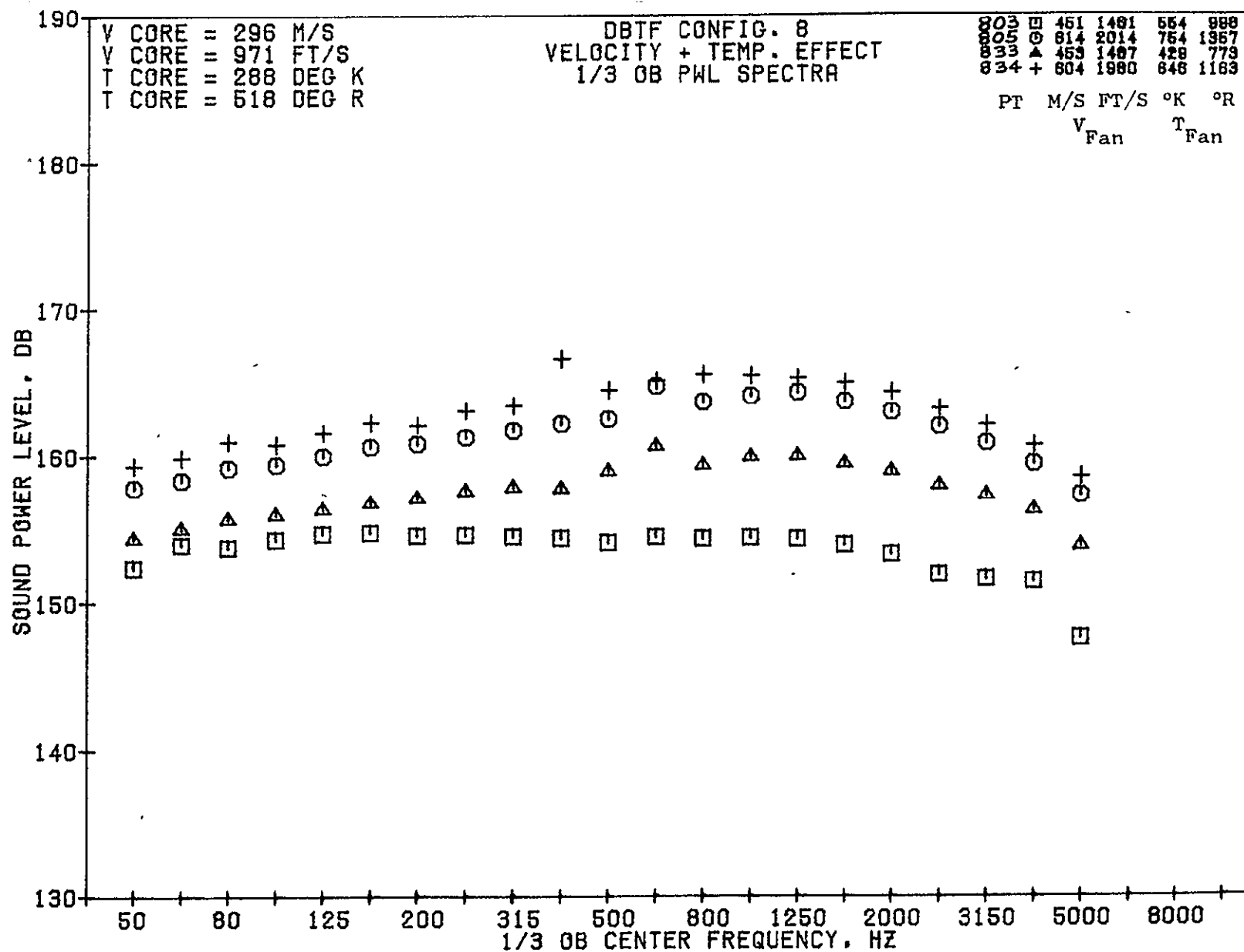
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5R524-001

79 BURCH A.



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5R524-001

79 BURGH A.

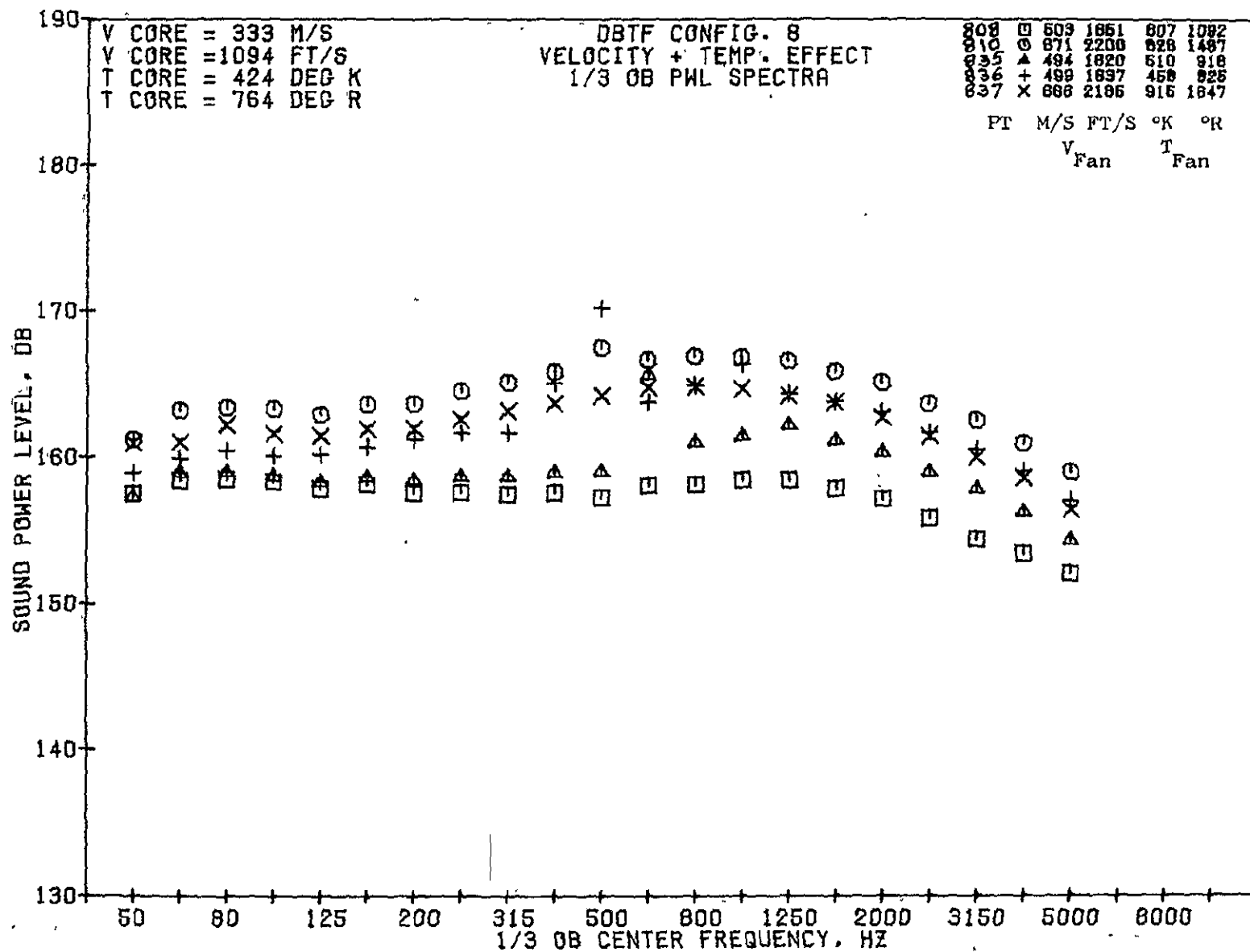


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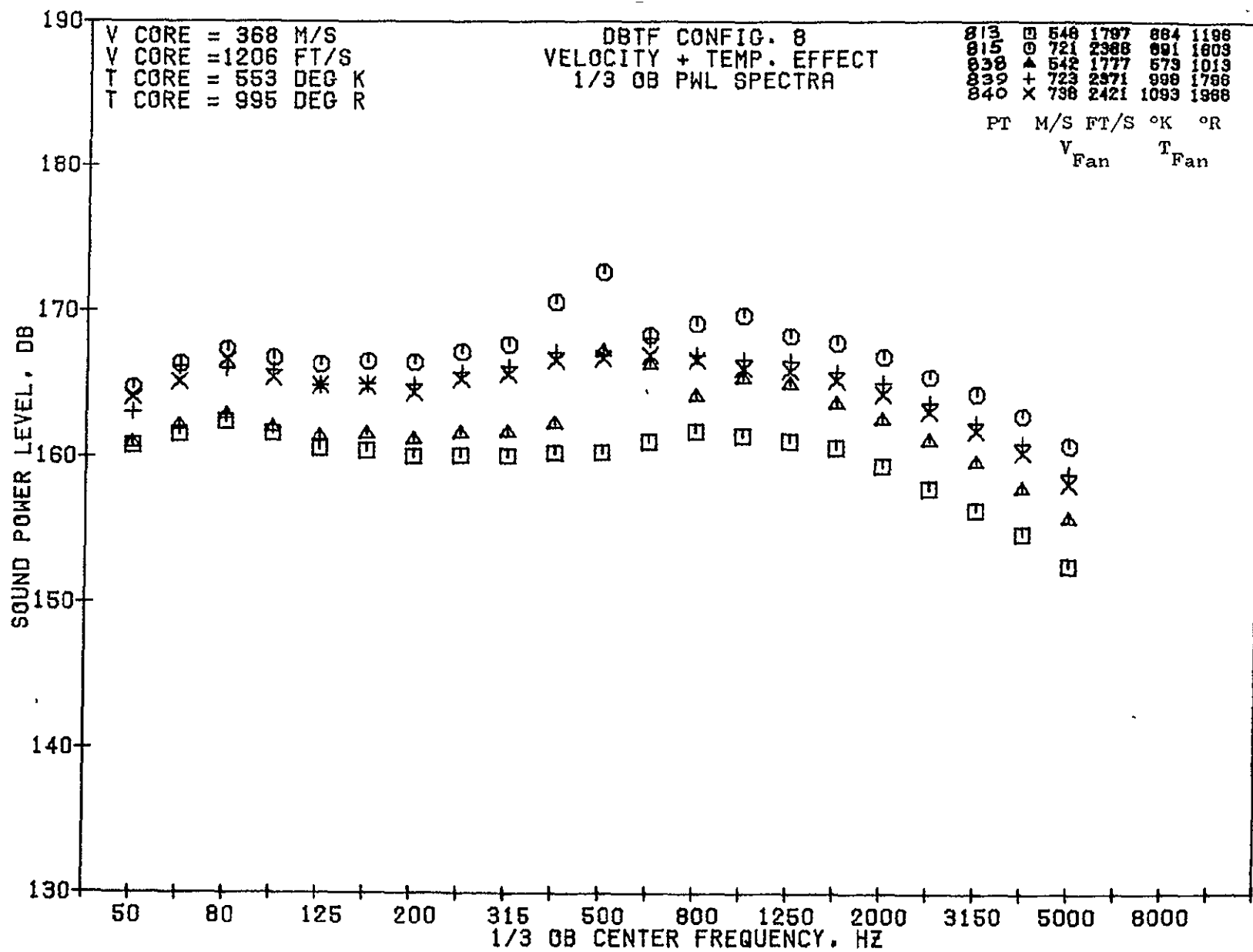
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5R524-001

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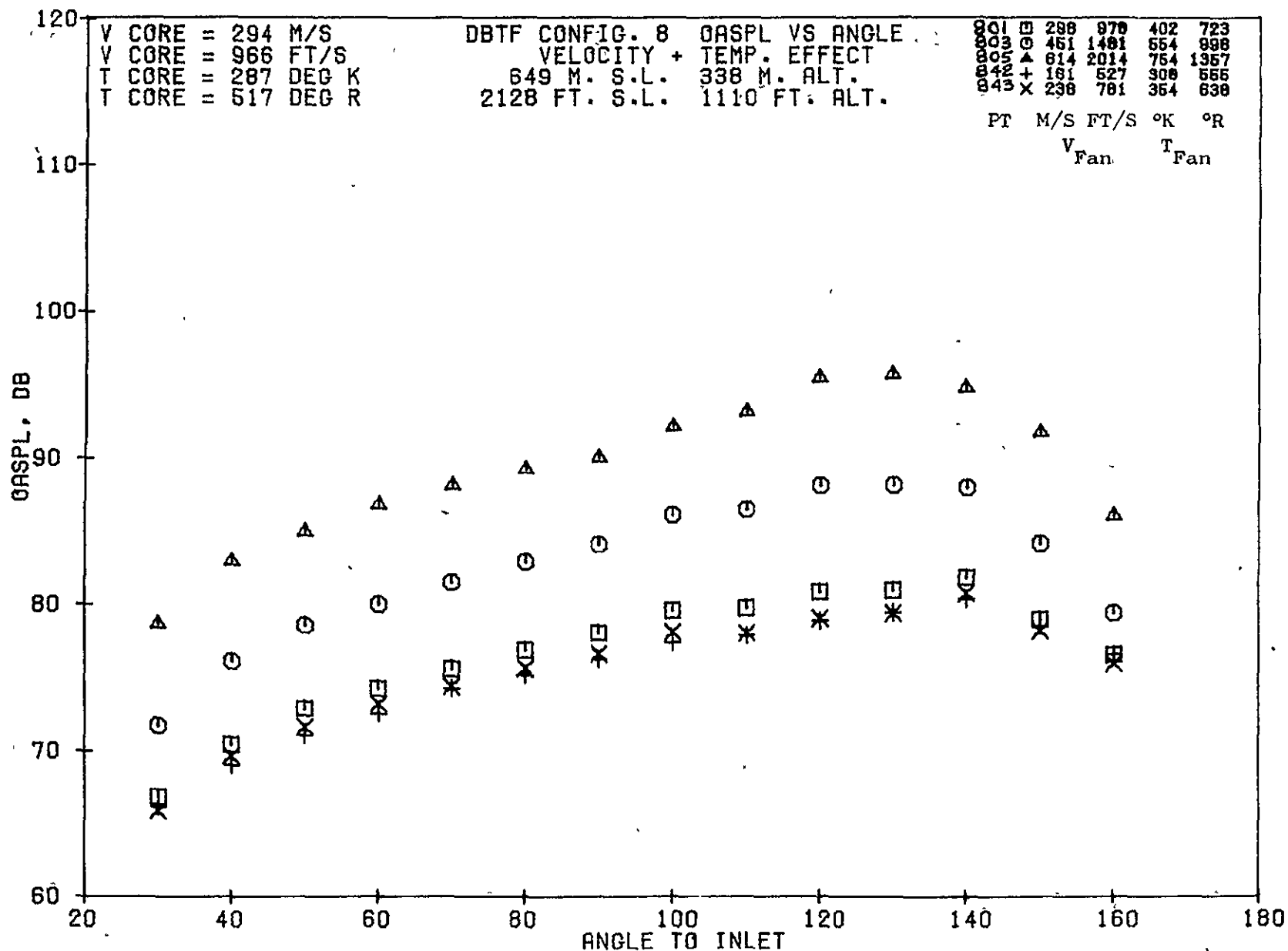


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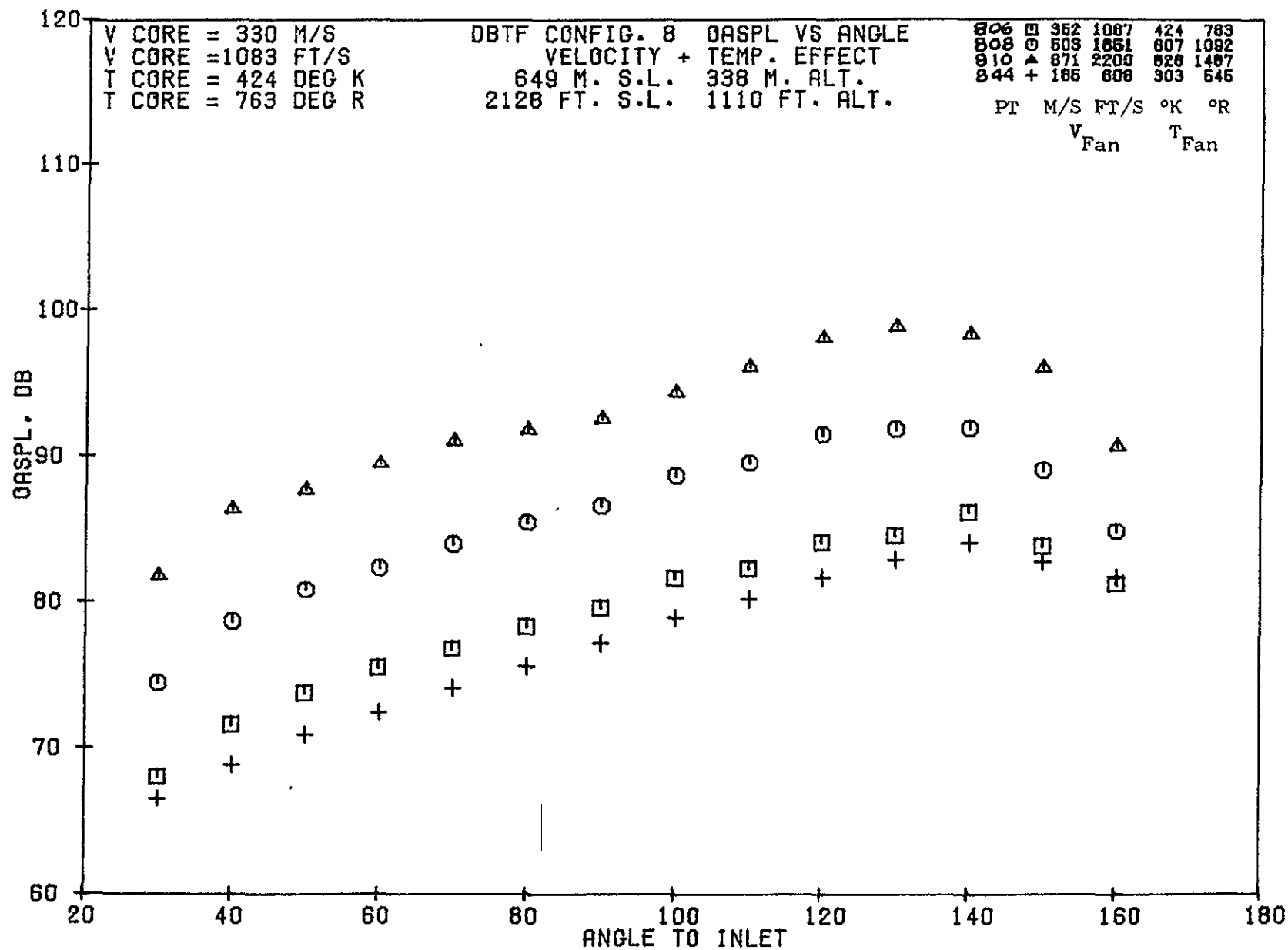
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5R524-001

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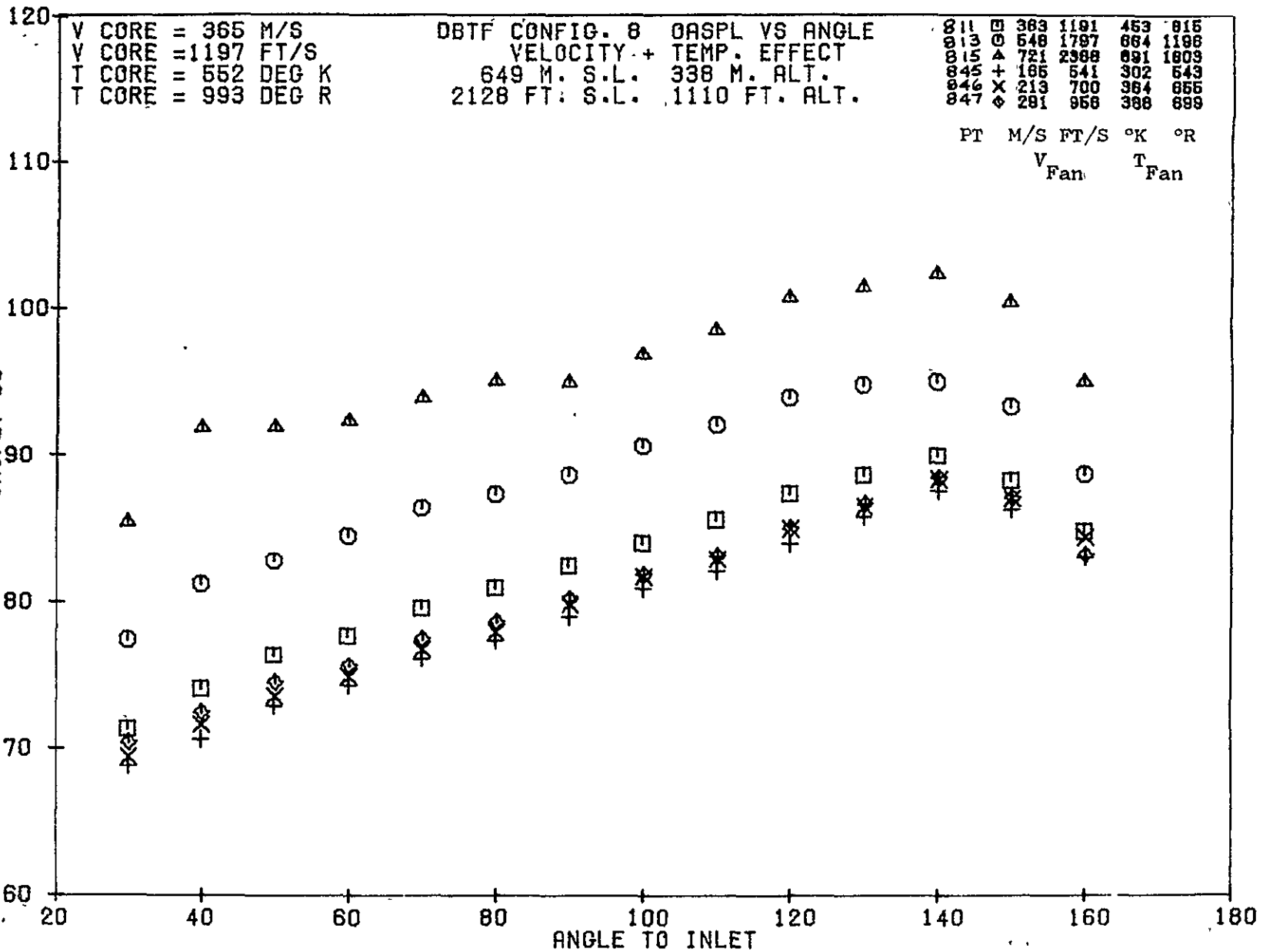


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5R524-001

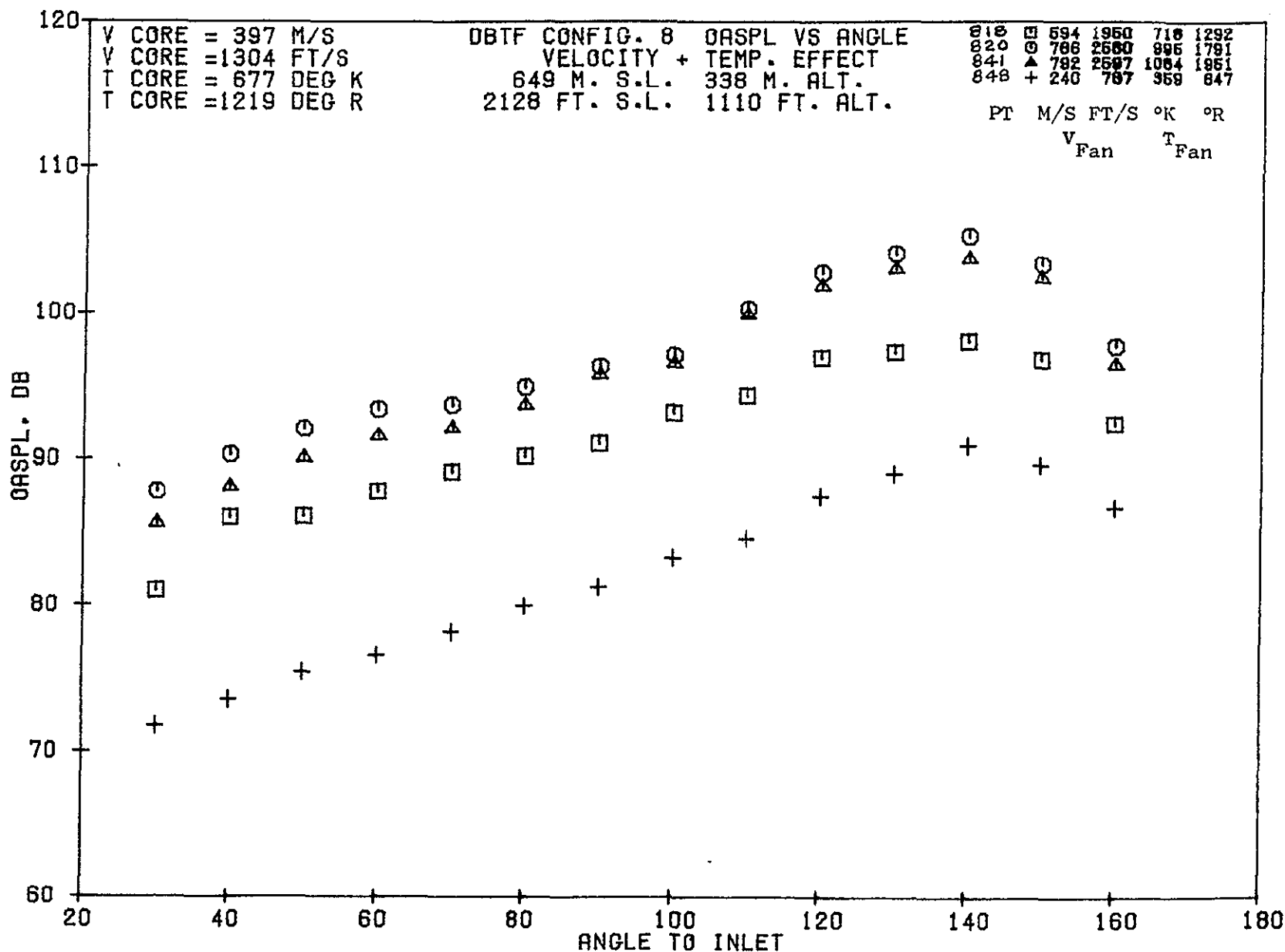
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08/20/75
5R524-001

79 BURCH A.



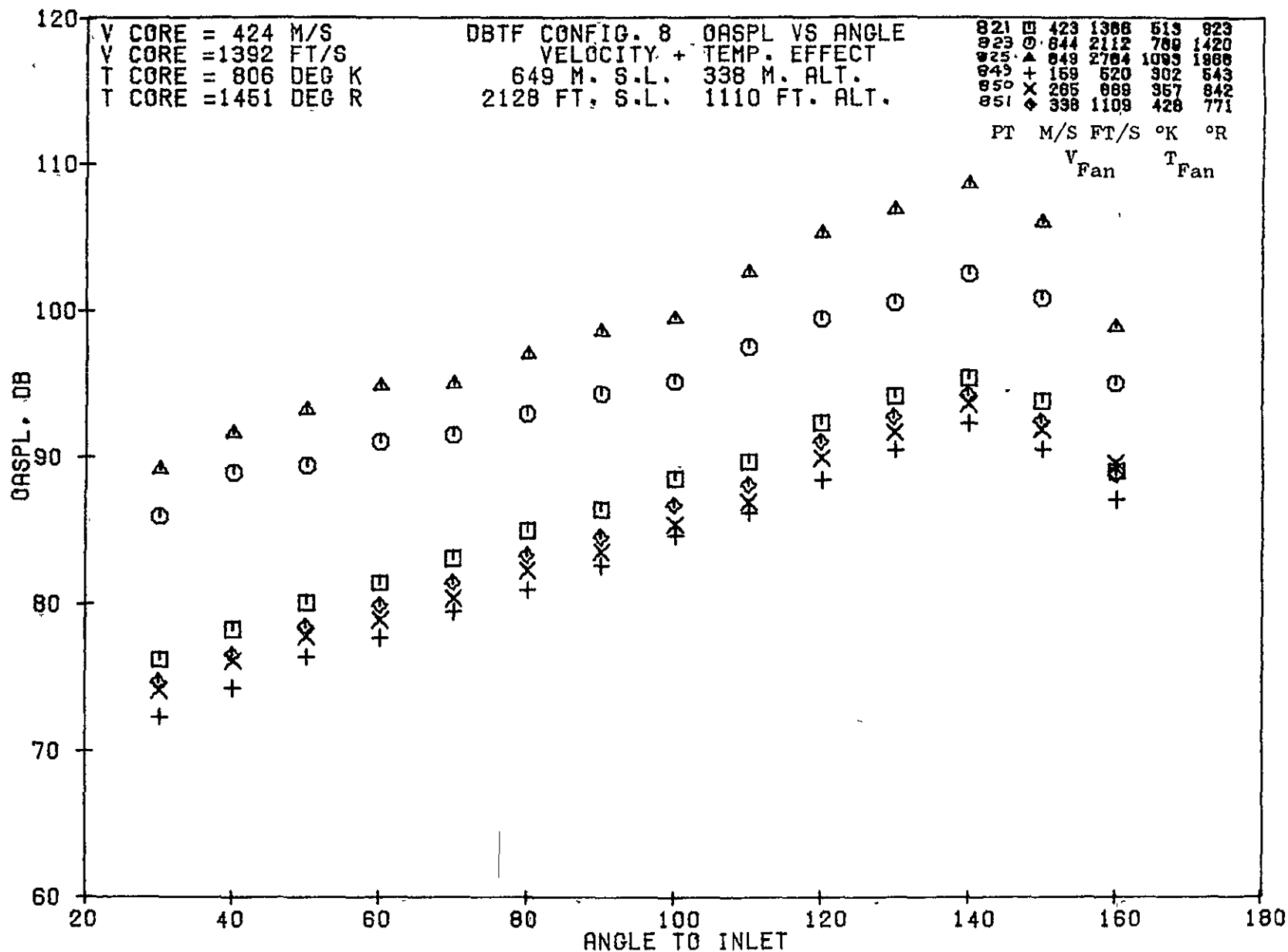
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5R524-001

79 BURCH A.

4-328

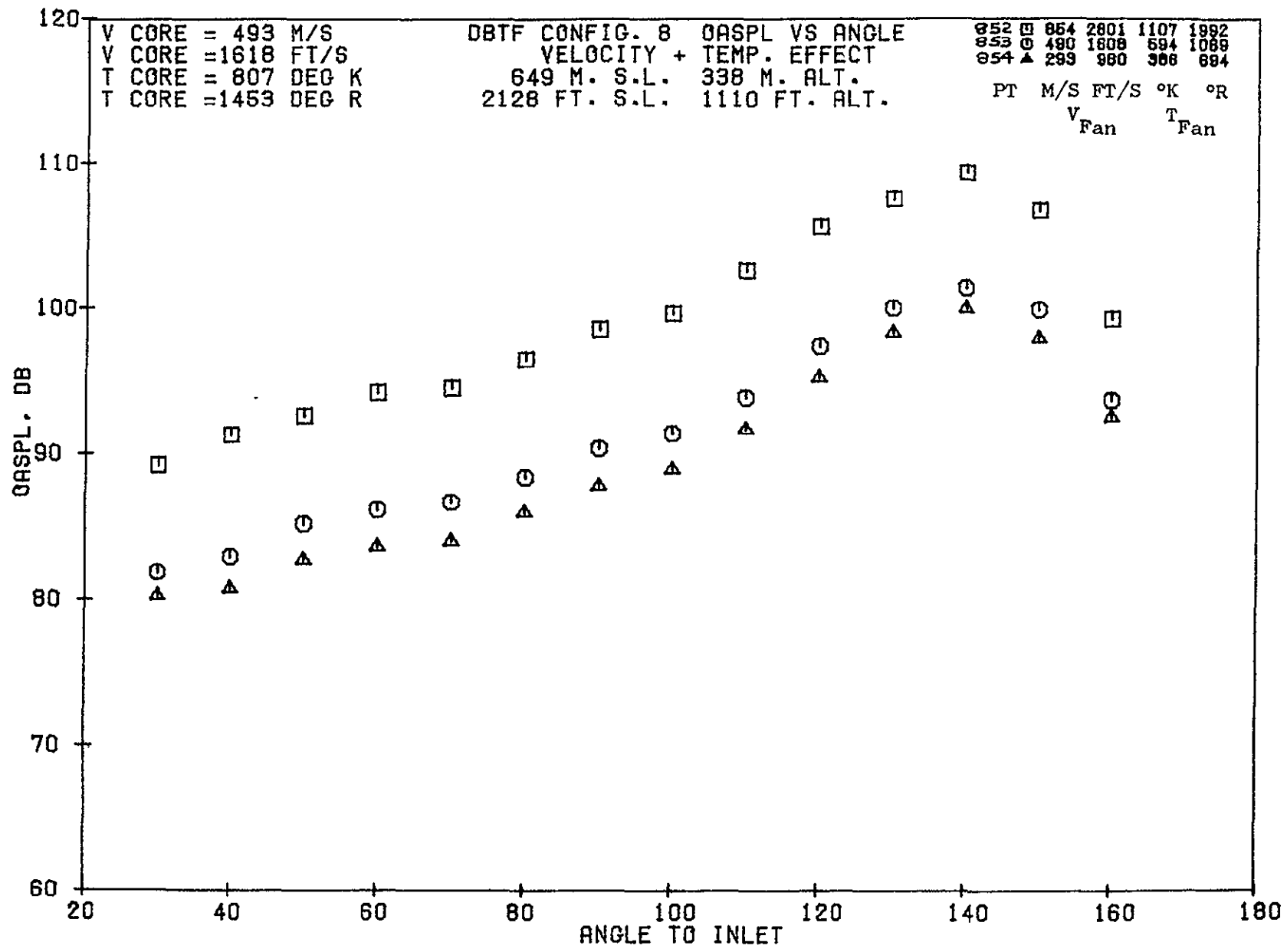
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5R524-001

79 BURCH A.

4-329



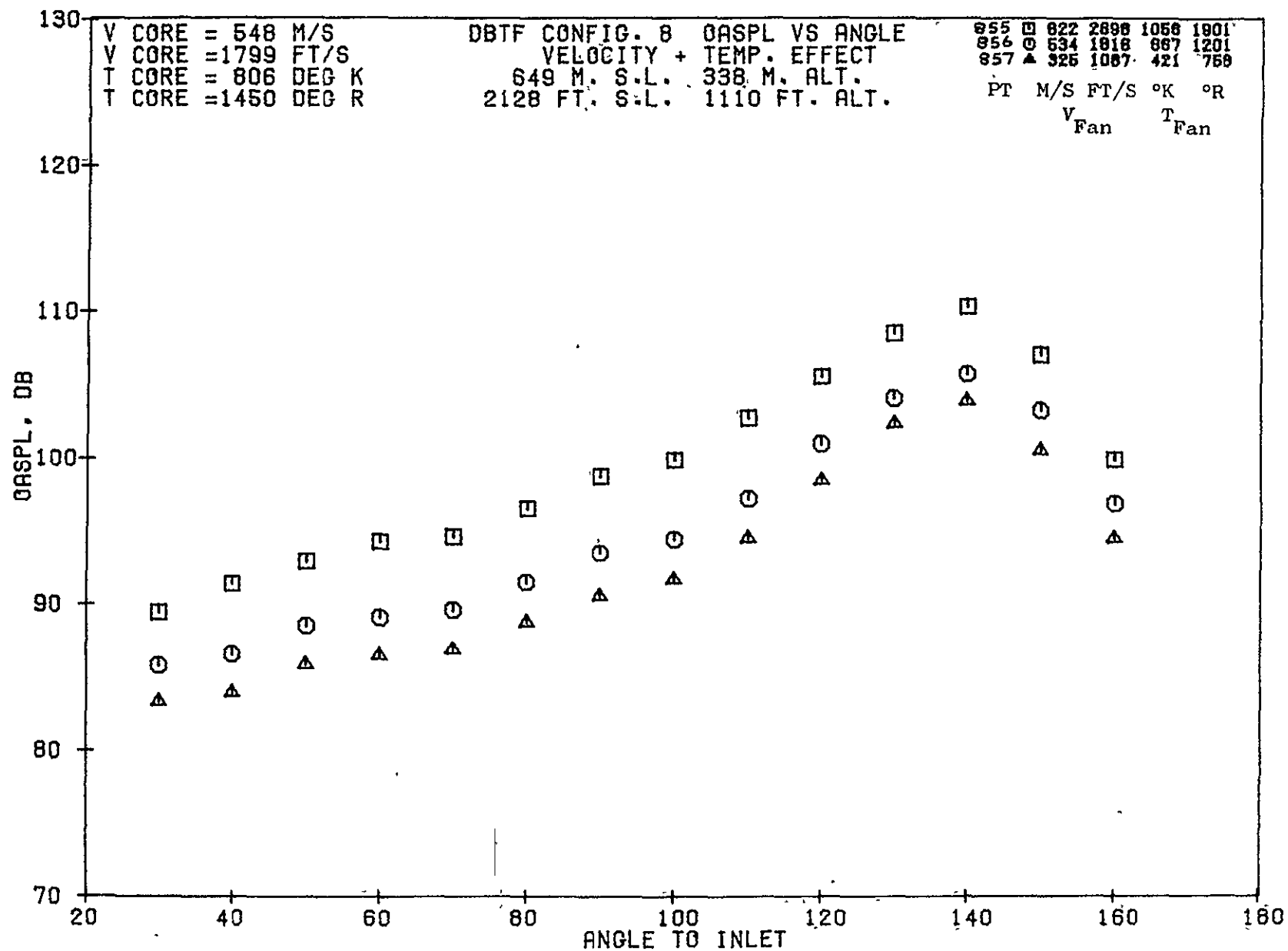
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5R524-001

79 BURCH A.

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11-556



08/20/76
5R524-001

79 BURCH A.

130

V CORE = 610 M/S
 V CORE = 2001 FT/S
 T CORE = 817 DEG K
 T CORE = 1471 DEG R

DBTF CONFIG. 8 OASPL VS ANGLE
 VELOCITY + TEMP. EFFECT
 649 M. S.L. 338 M. ALT.
 2128 FT. S.L. 1110 FT. ALT.

PT	M/S	FT/S	°K	°R
858	759	2469	964	1717
859	817	2023	752	1353
860	388	1201	462	832

V_{Fan} T_{Fan}

120

110

100

90

80

70

OASPL, DB

20

40

60

80

100

120

140

160

180

ANGLE TO INLET

1575

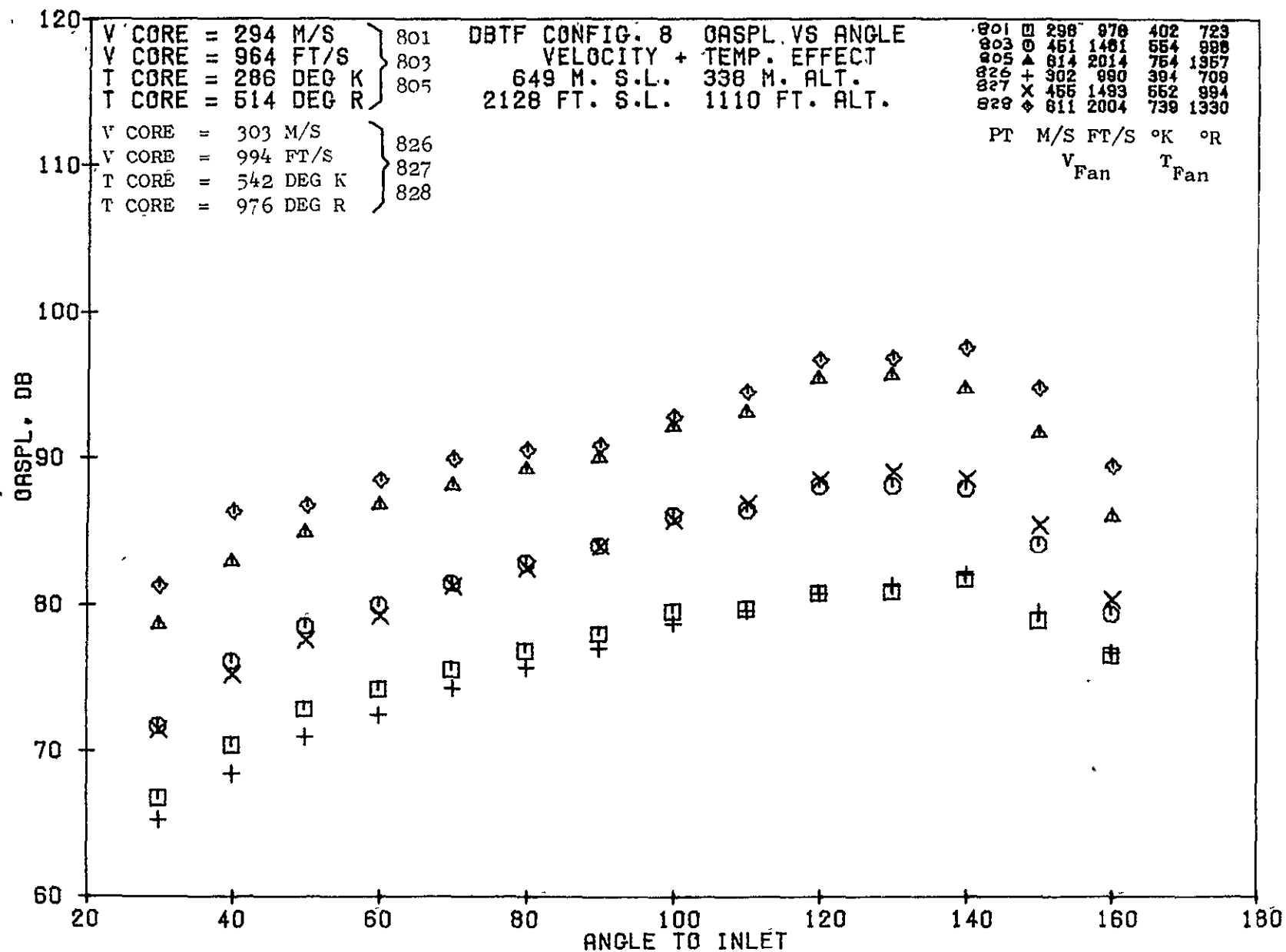
08/20/75
 5R524-001

79 BURCH R.

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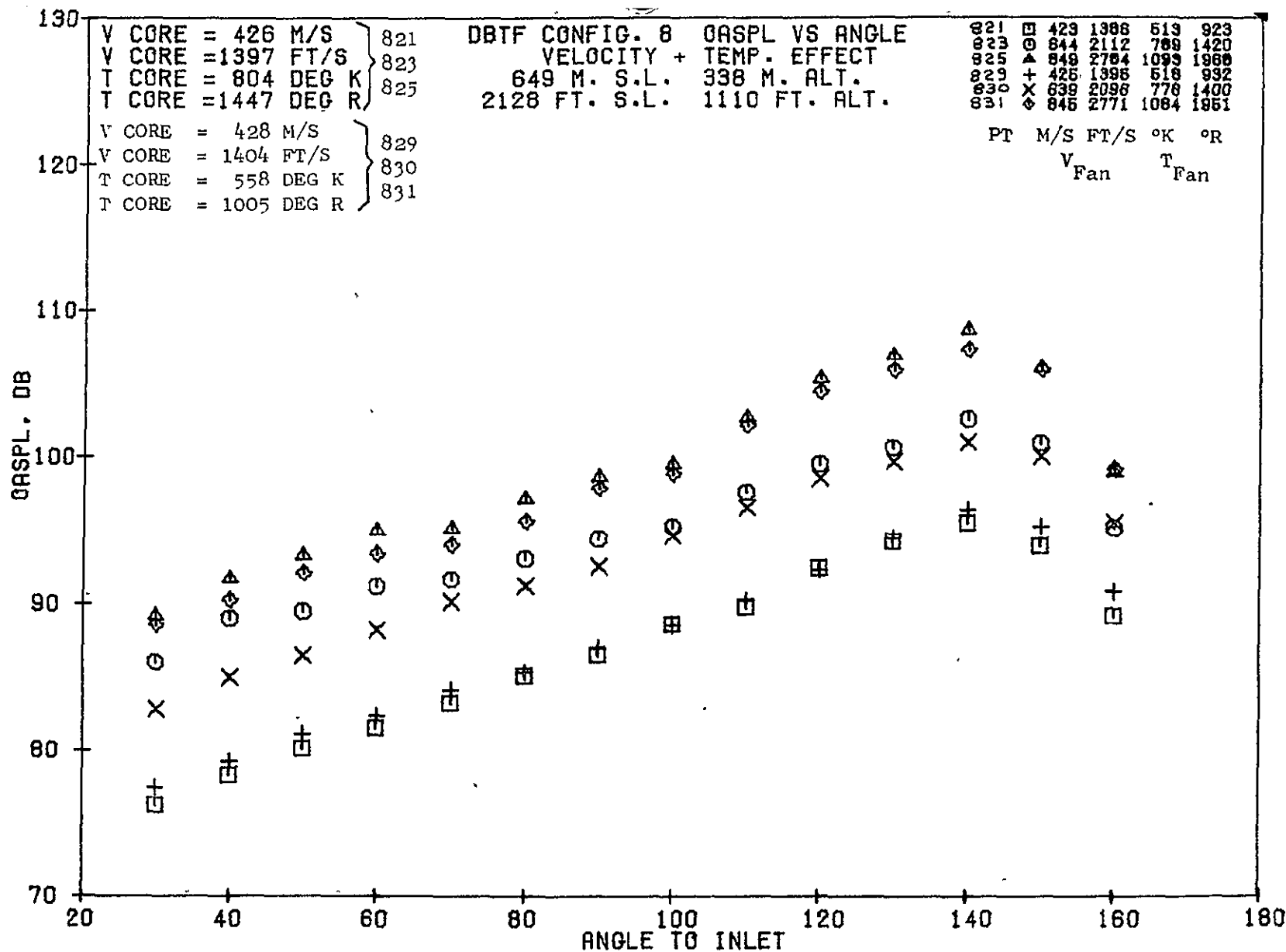
4-332

1576



08/20/75
5R524-001

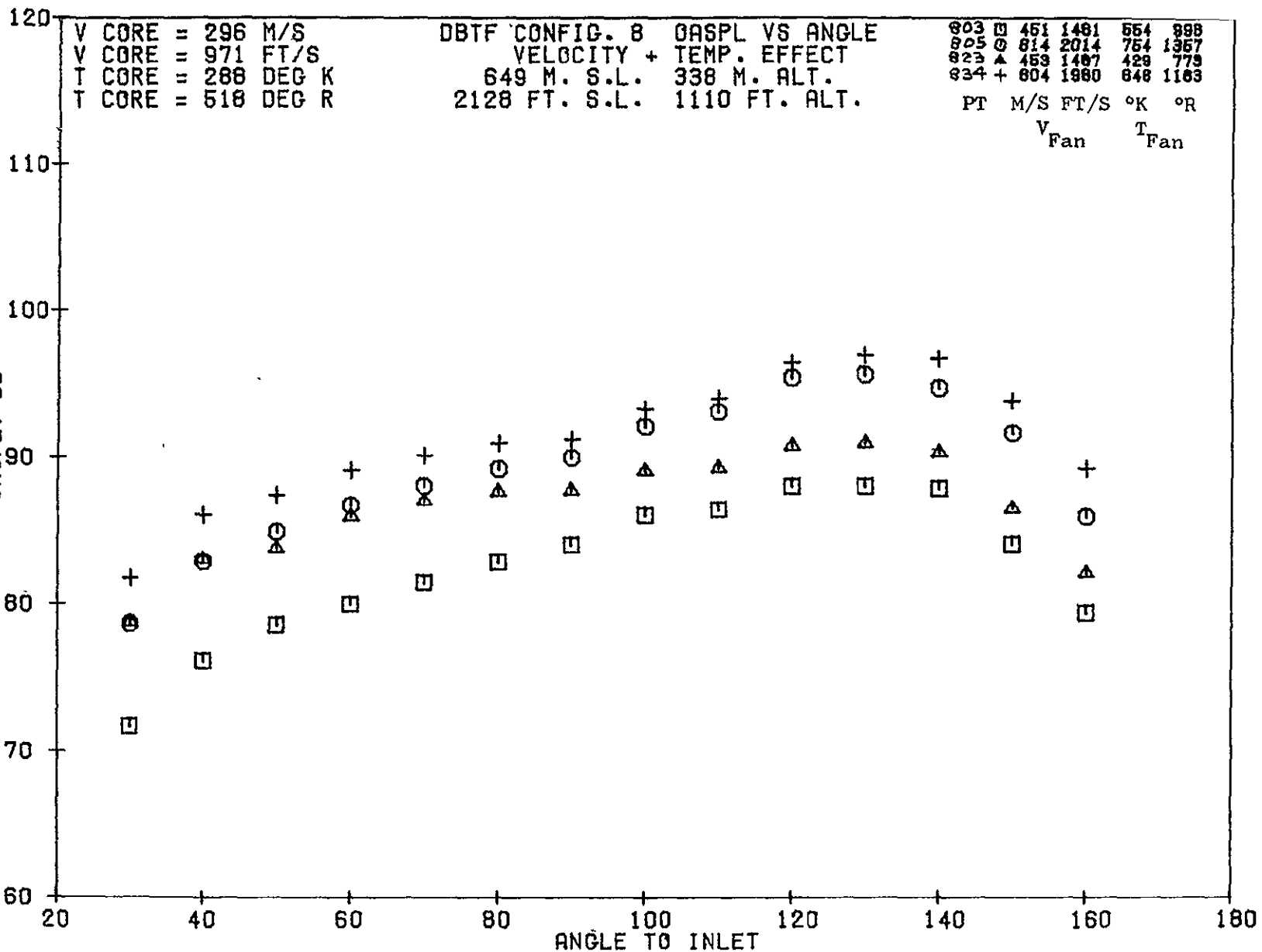
79 BURCH A.



08/20/75
5R524-001

79 BURCH A.

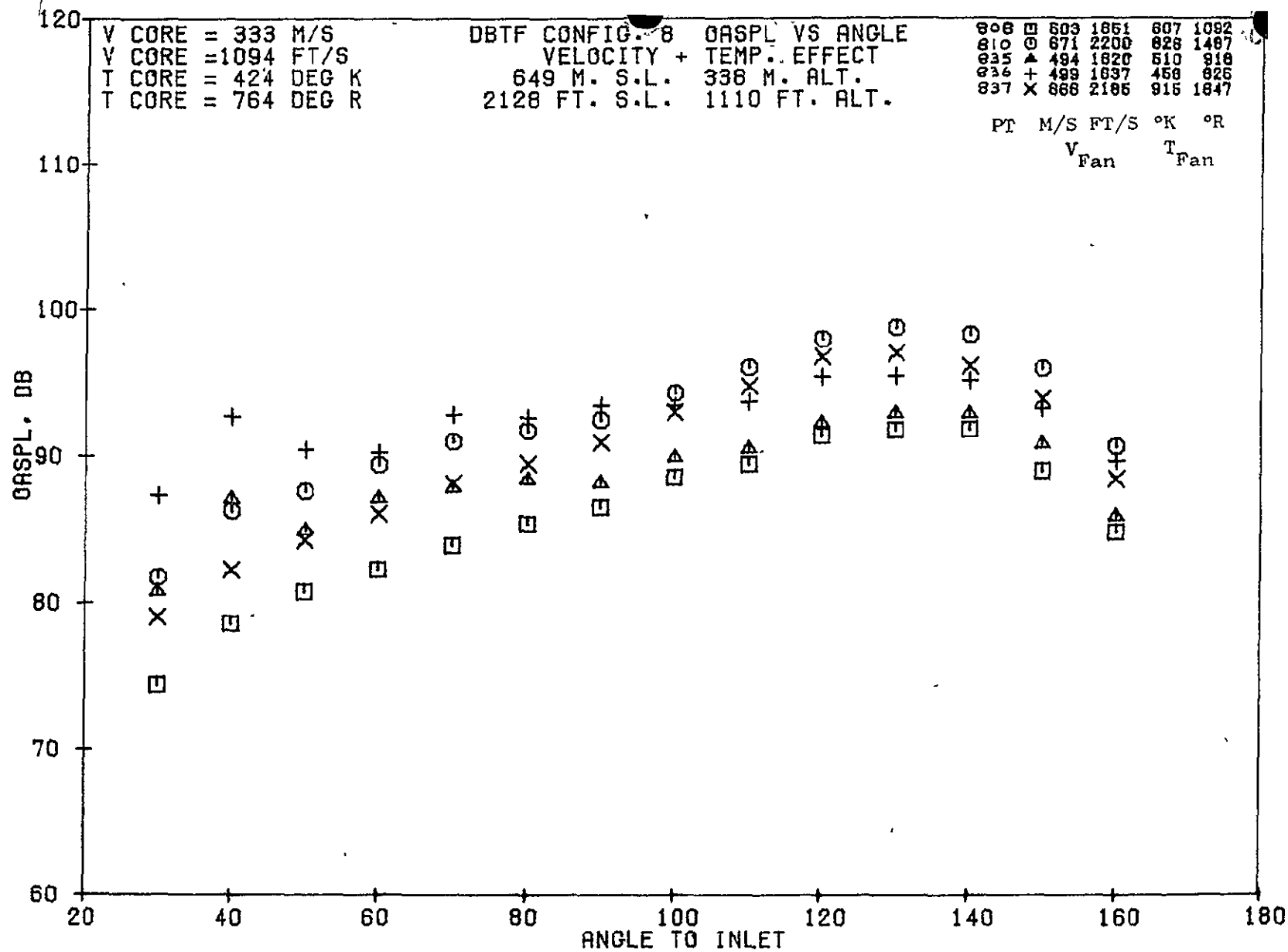
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08/20/76
5R524-001

79 BURCH A.

1579

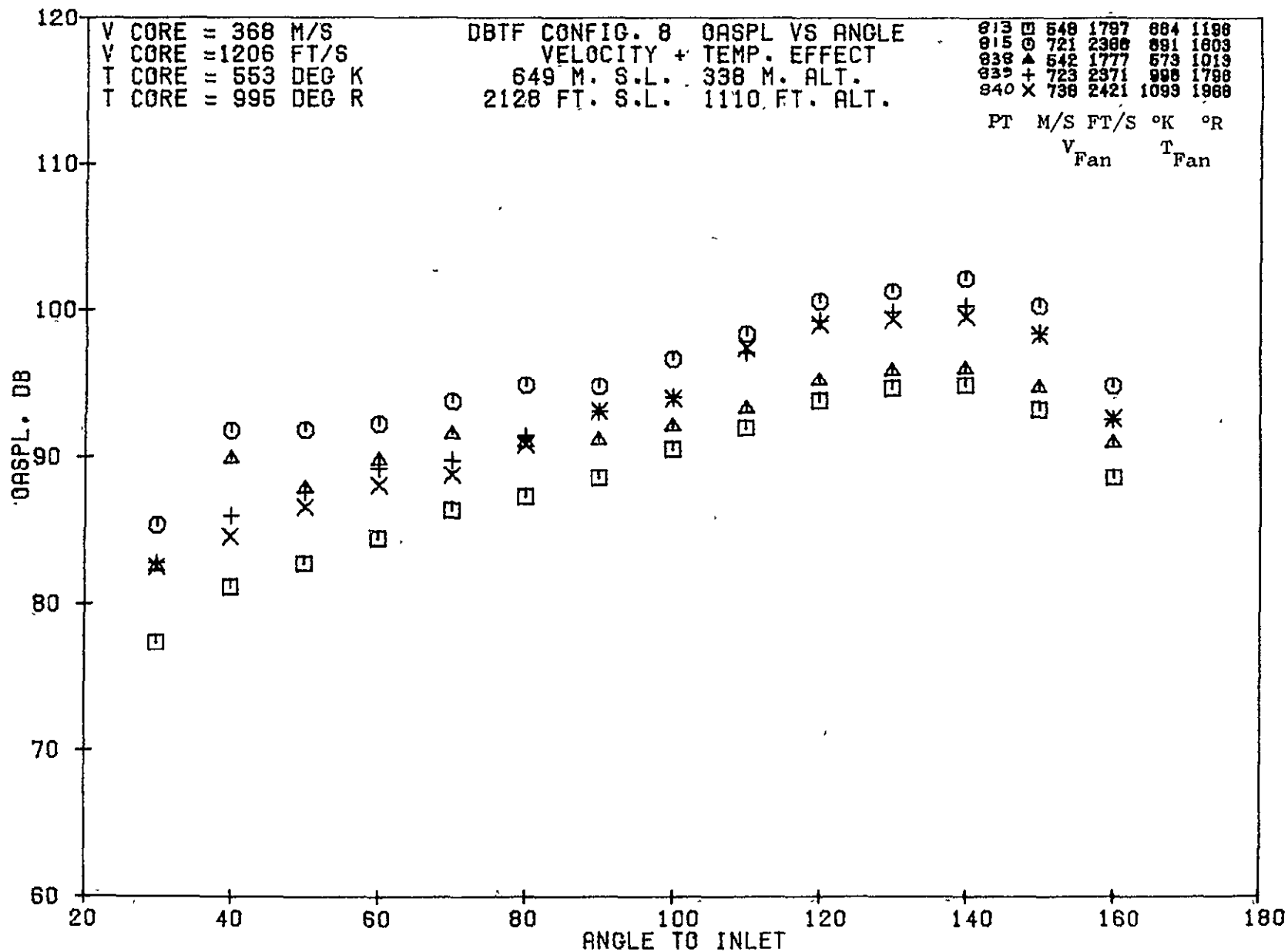


08/20/75
5R524-001

79 BURCH A.

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1580



08/20/75
5R524-001

79 BURCH A.

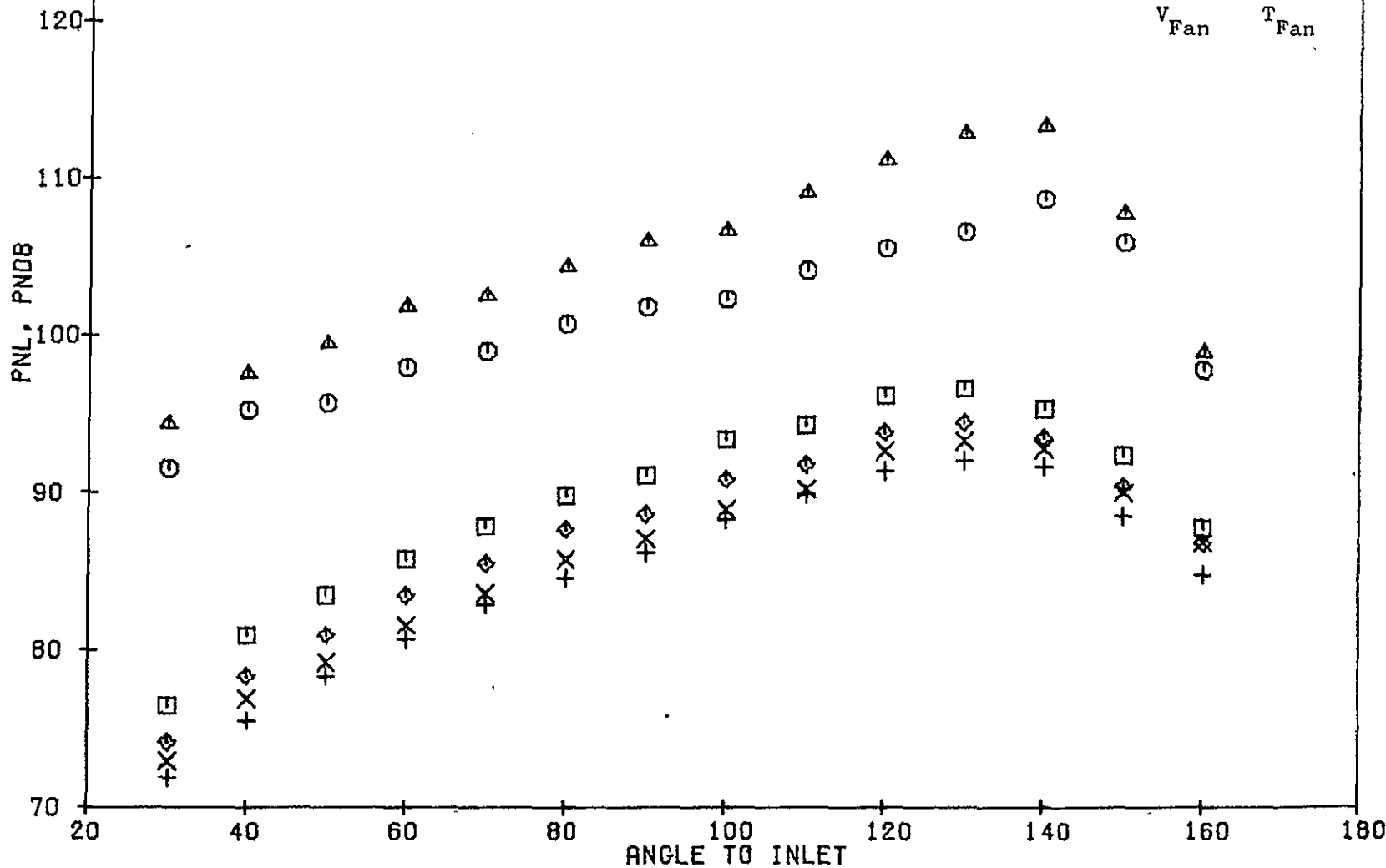
PNL, PNDB

V CORE = 424 M/S
 V CORE = 1392 FT/S
 T CORE = 806 DEG K
 T CORE = 1451 DEG R

DBTF CONFIG. 8 PNL VS ANGLE
 VELOCITY + TEMP. EFFECT
 649 M. S.L. 338 M. ALT.
 2128 FT. S.L. 1110 FT. ALT.

821	823	825	849	850	851
423	1386	613	923		
844	2112	789	1420		
848	2764	1083	1886		
159	520	302	543		
265	888	357	642		
338	1109	426	771		

PT M/S FT/S °K °R
 V_{Fan} T_{Fan}

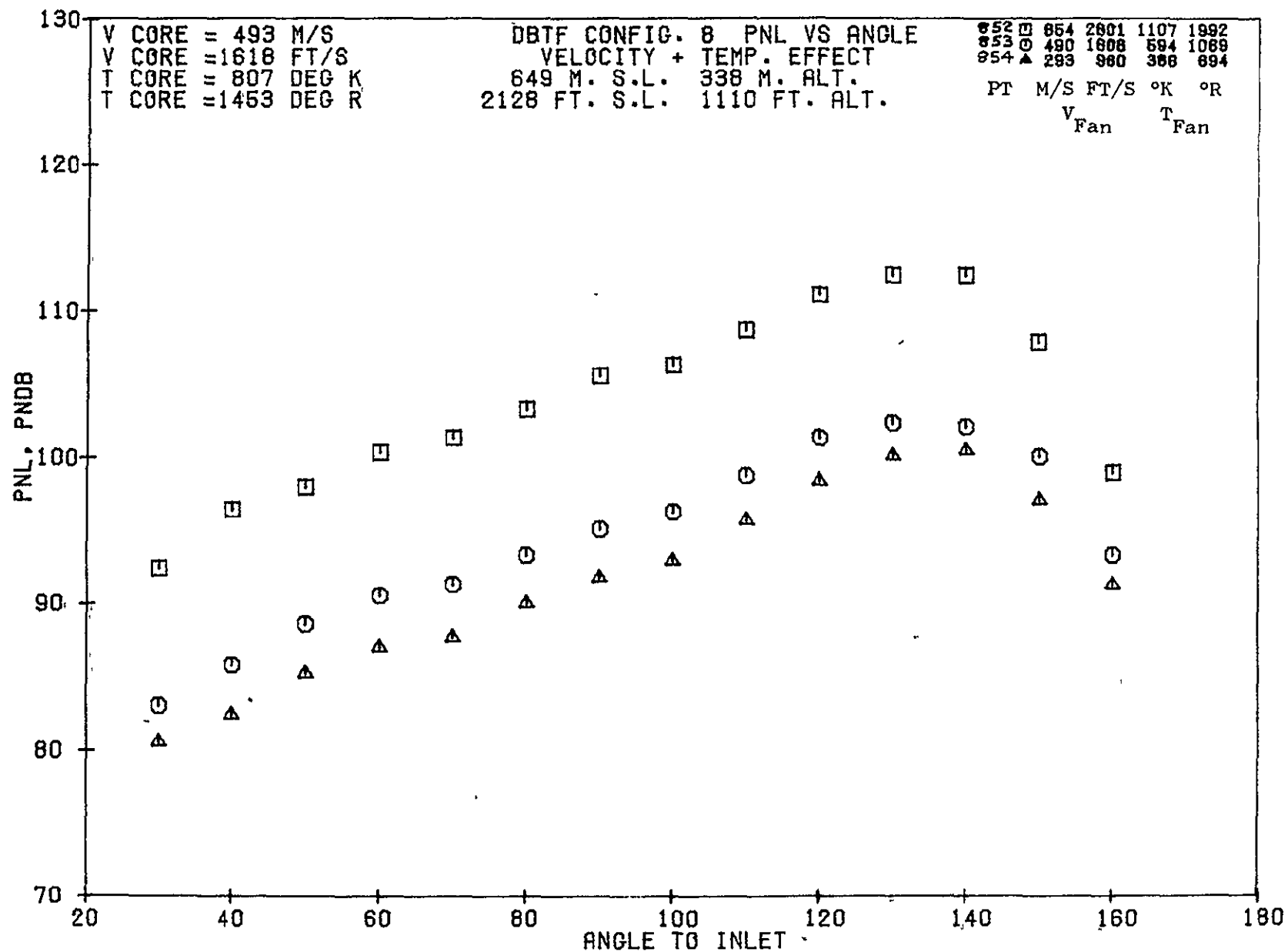


08/20/75
 5R524-001

79 BURCH A.

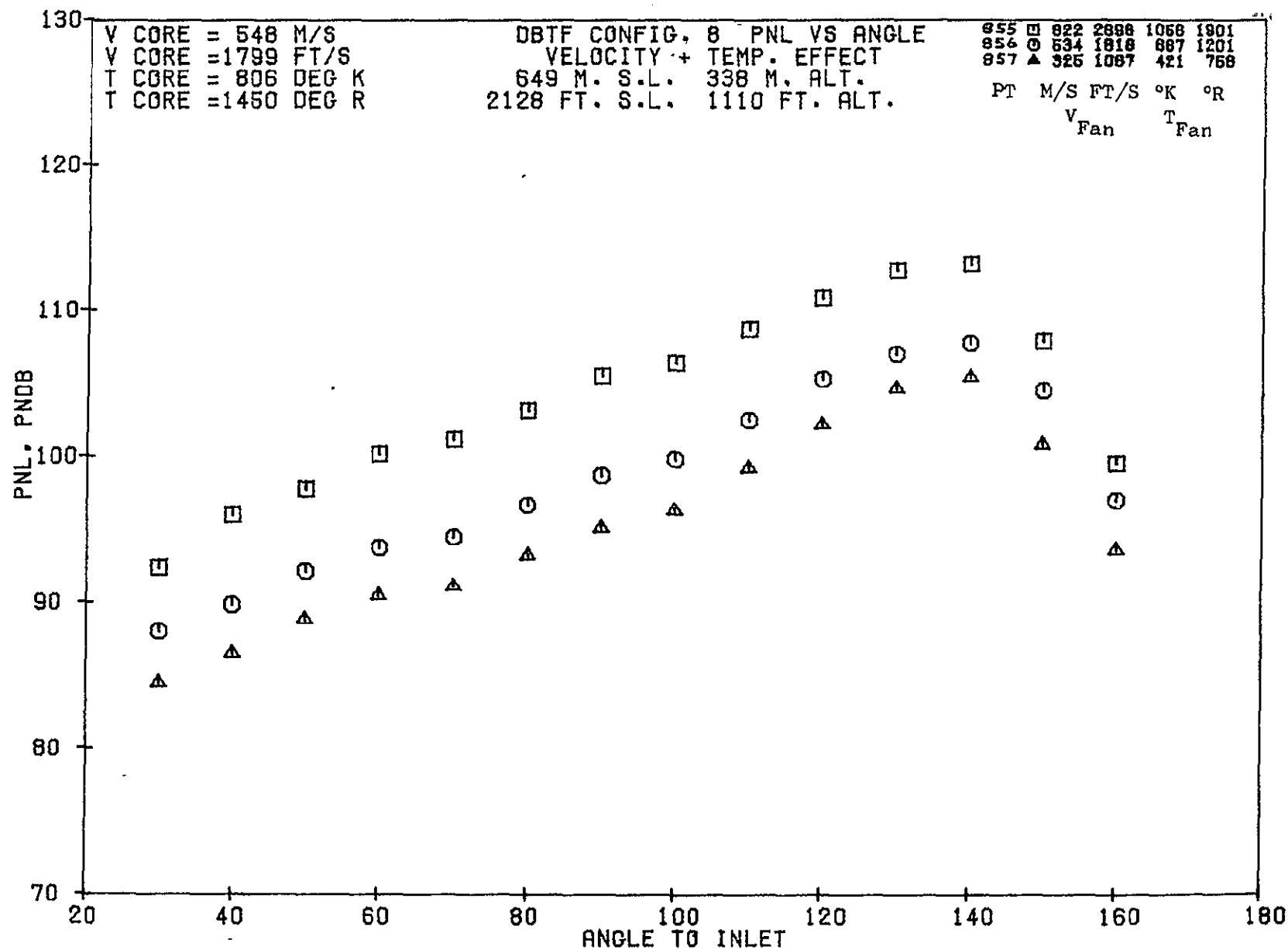
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11-338



08/20/75
5R524-001

79 BURCH A.

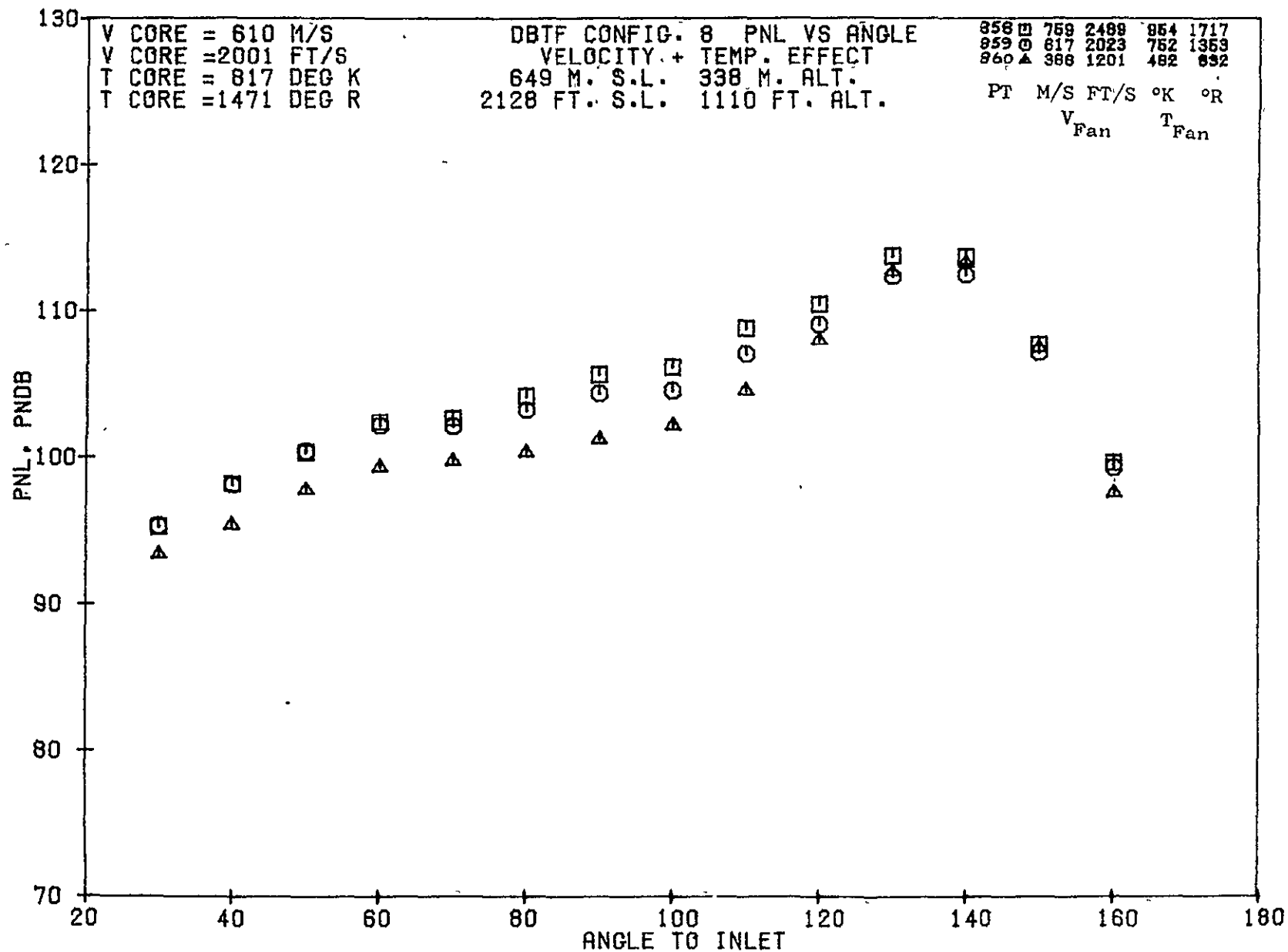


08/20/75
5R524-001

79 BURCH A.

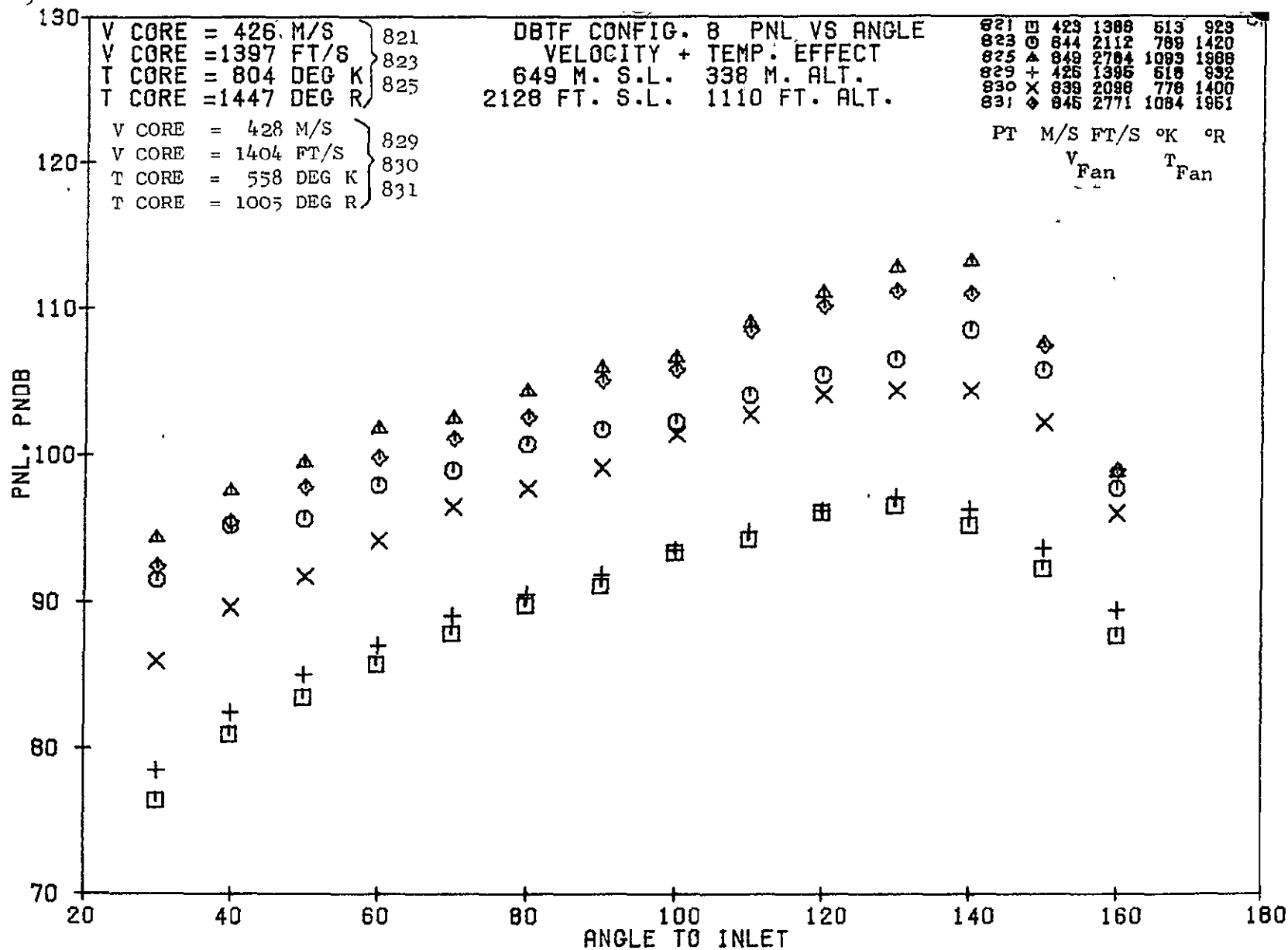
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4-27c



08/20/75
5R524-001

79 BURCH A.

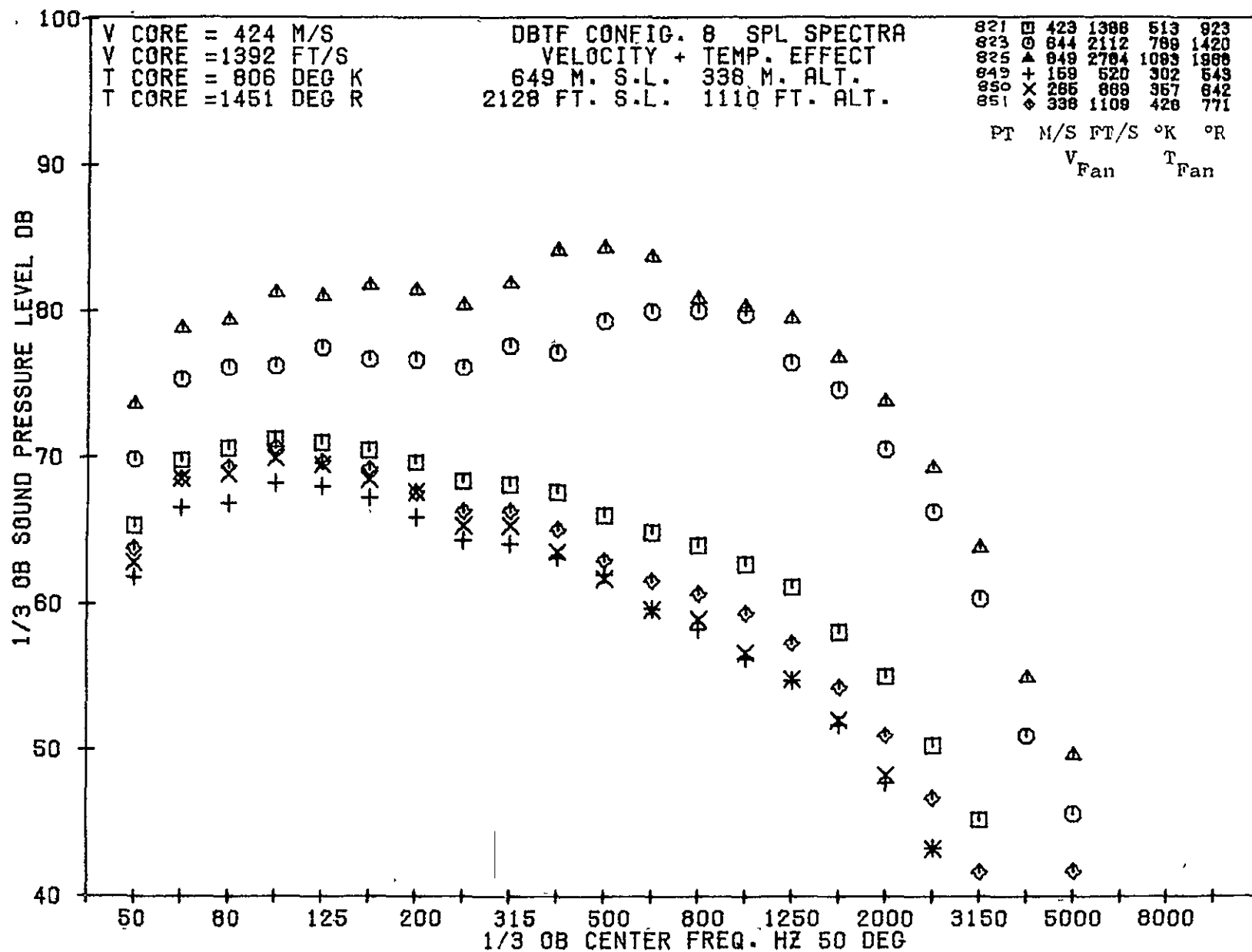


08/20/75
5R524-001

79 BURCH A.

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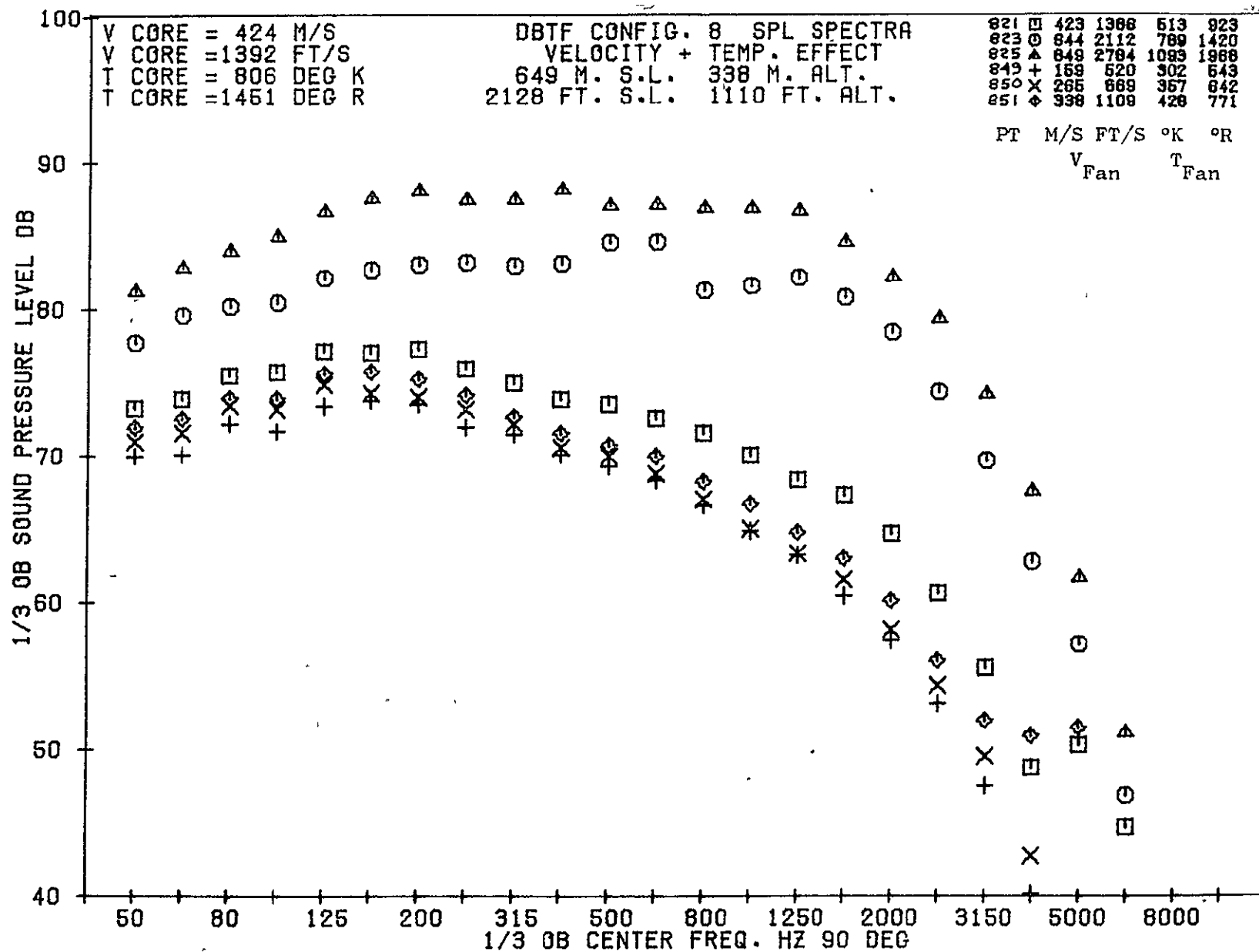
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08/20/75
5R524-001

79 BURCH A.

1587

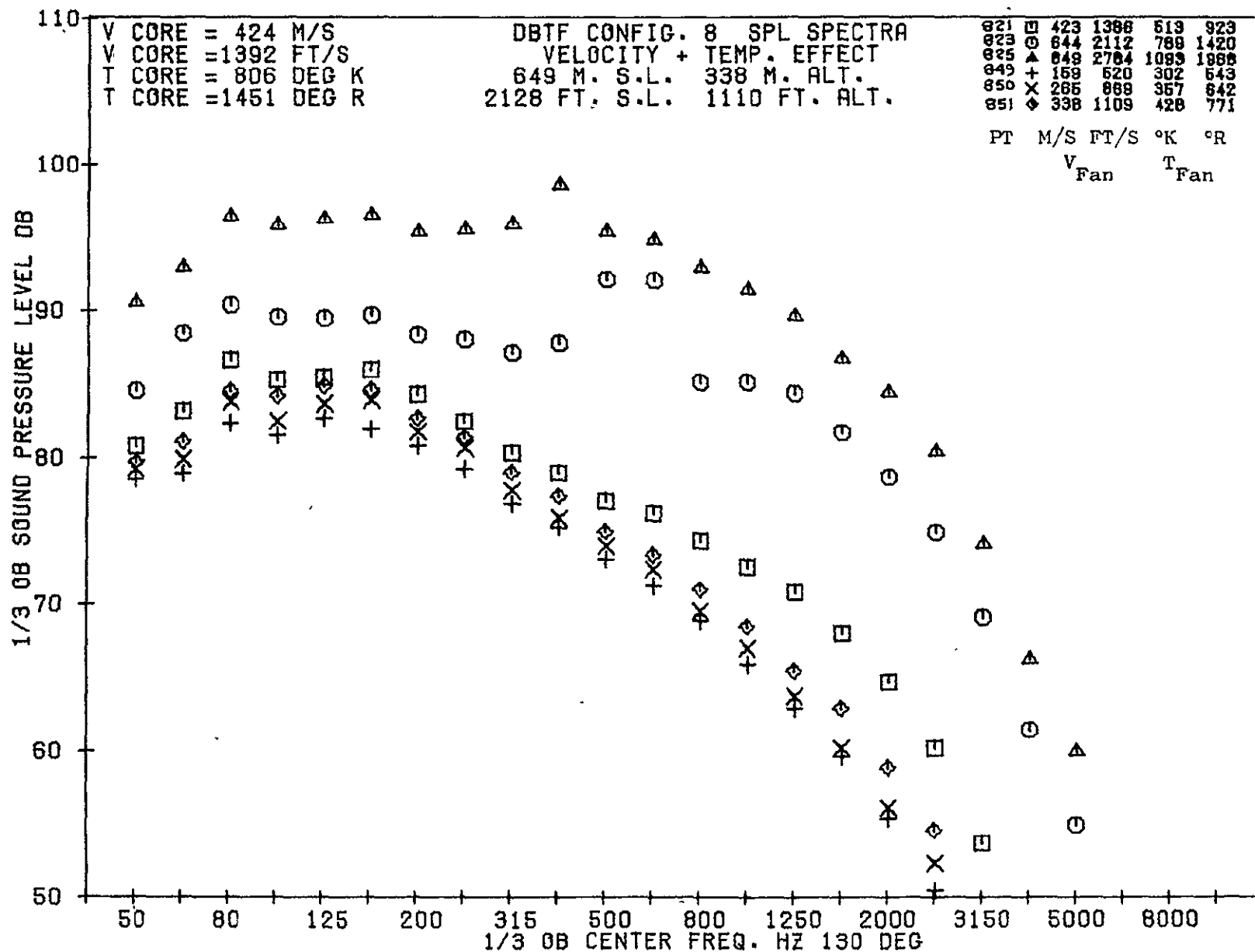
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5R524-001

79 BURCH A.

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4-344

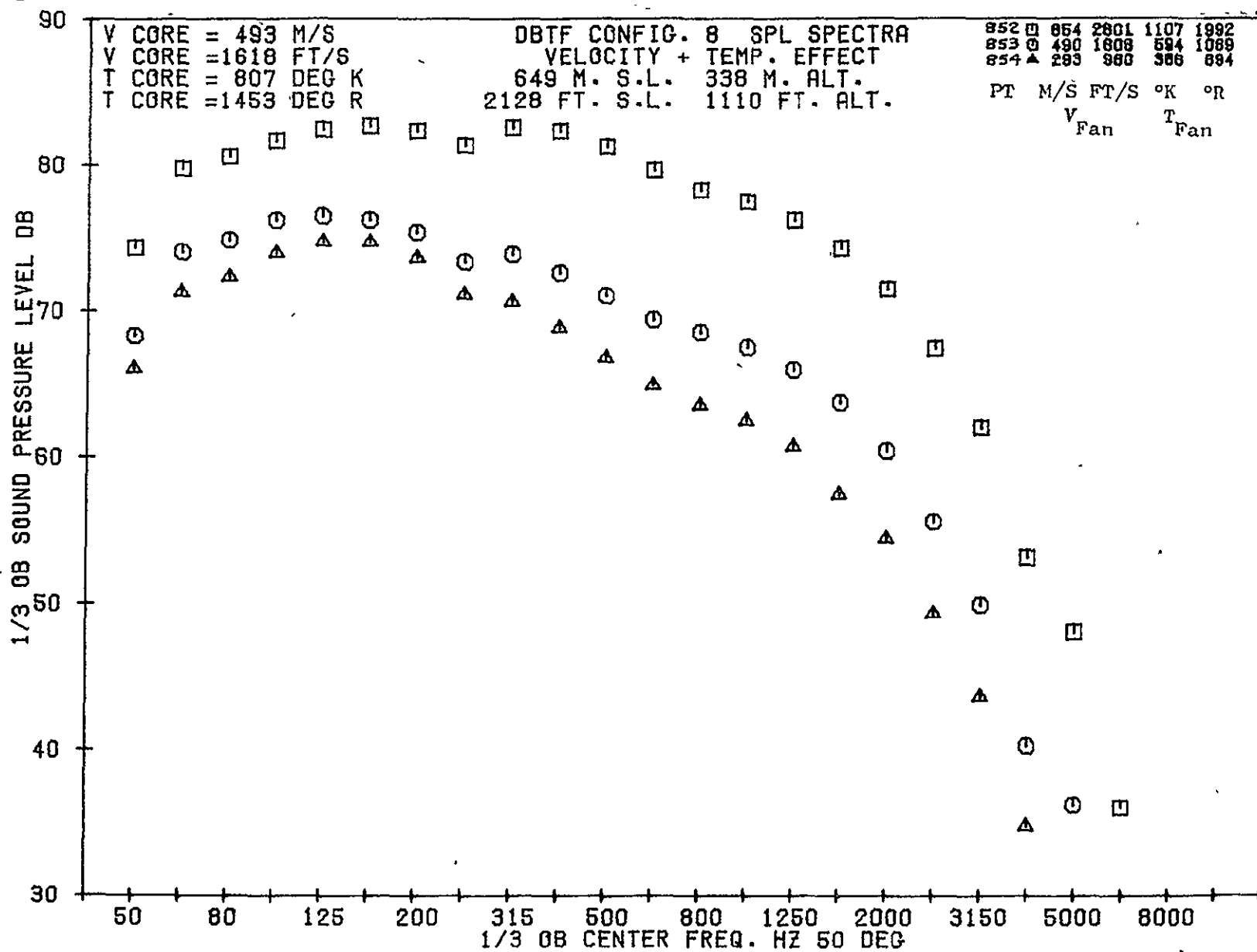
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08/20/75
5R524-001

79 BURCH A.

1589

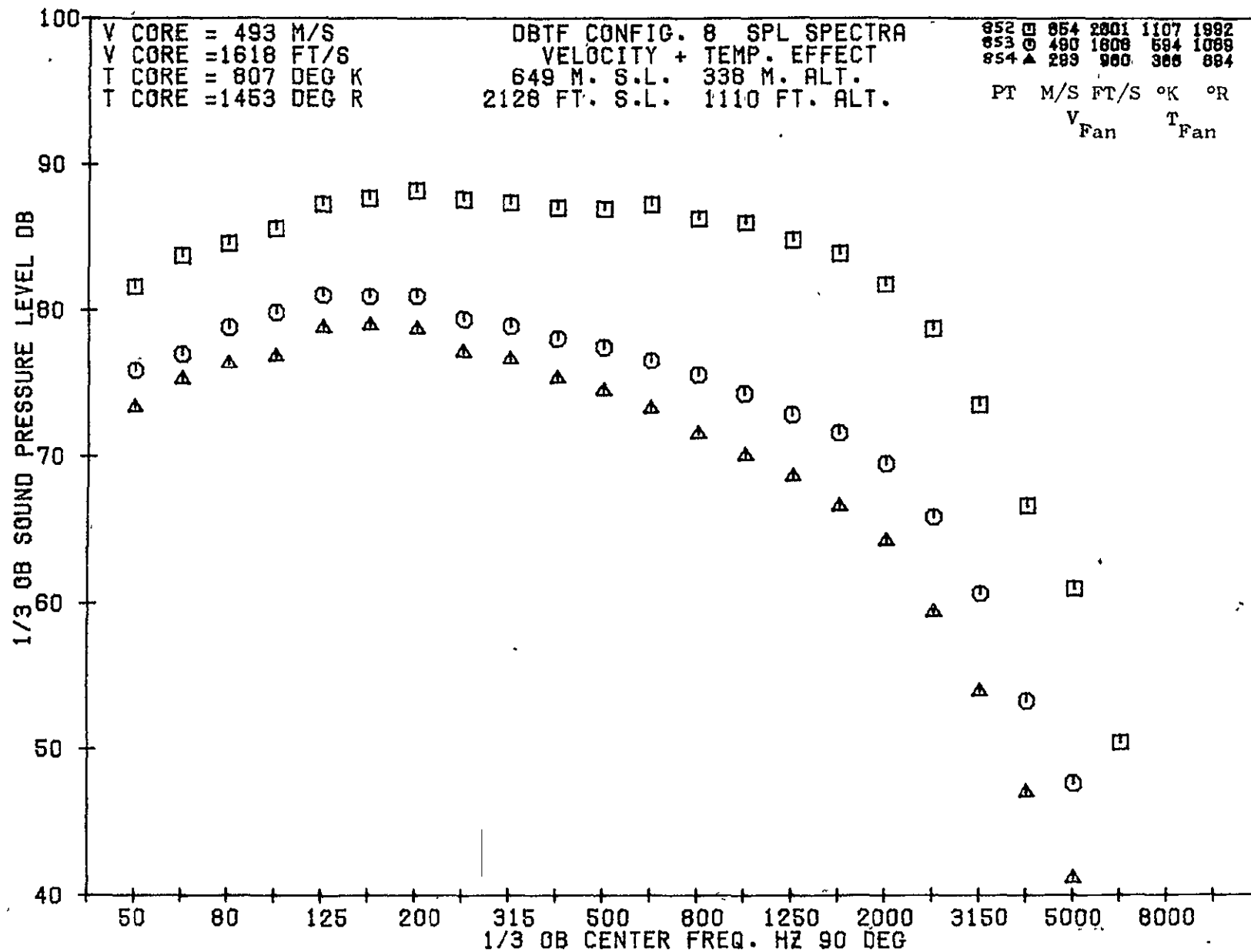


08/20/75
5R524-001

79 BURCH A.

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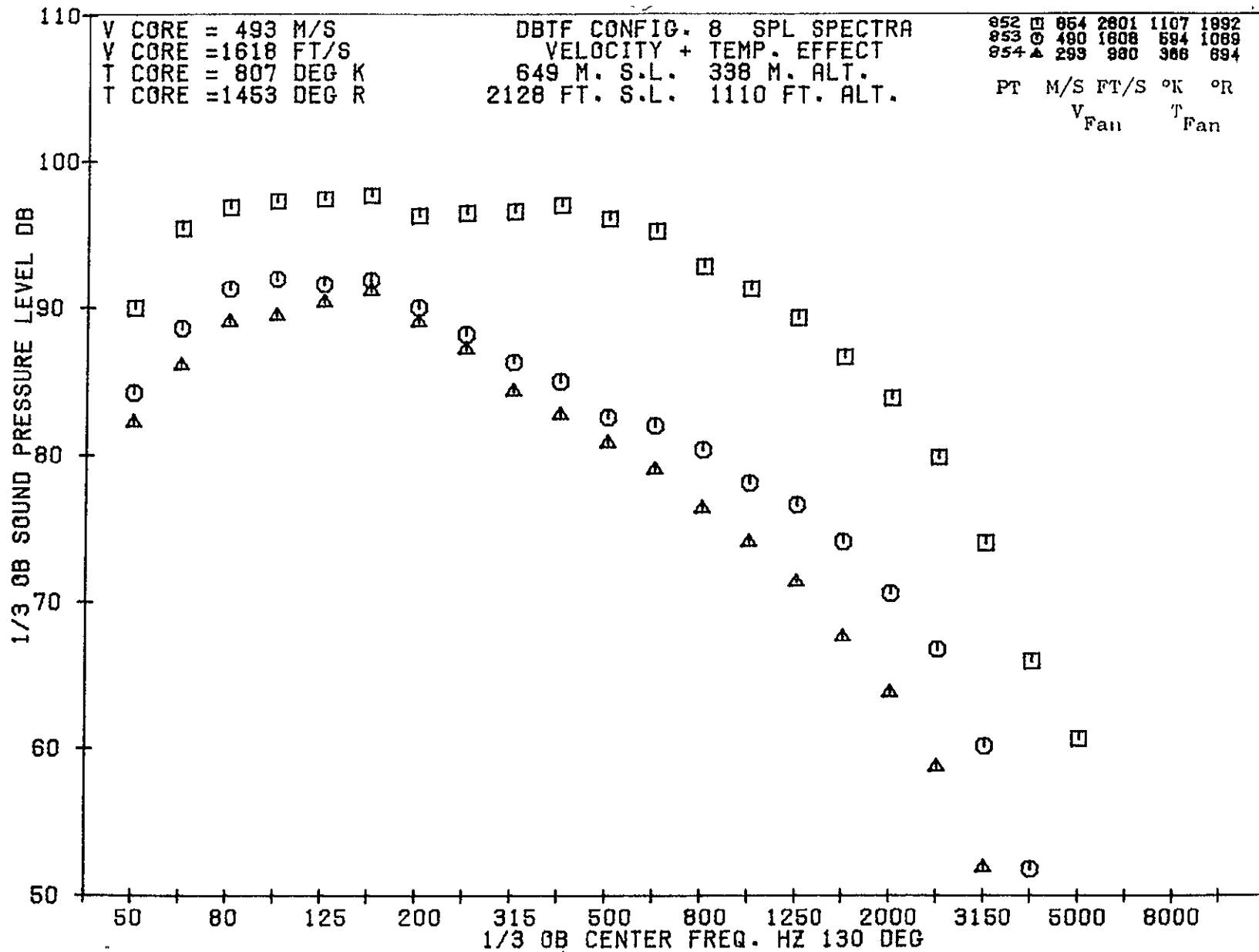
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08/20/75
5R524-001

79 BUREAU A.

1591

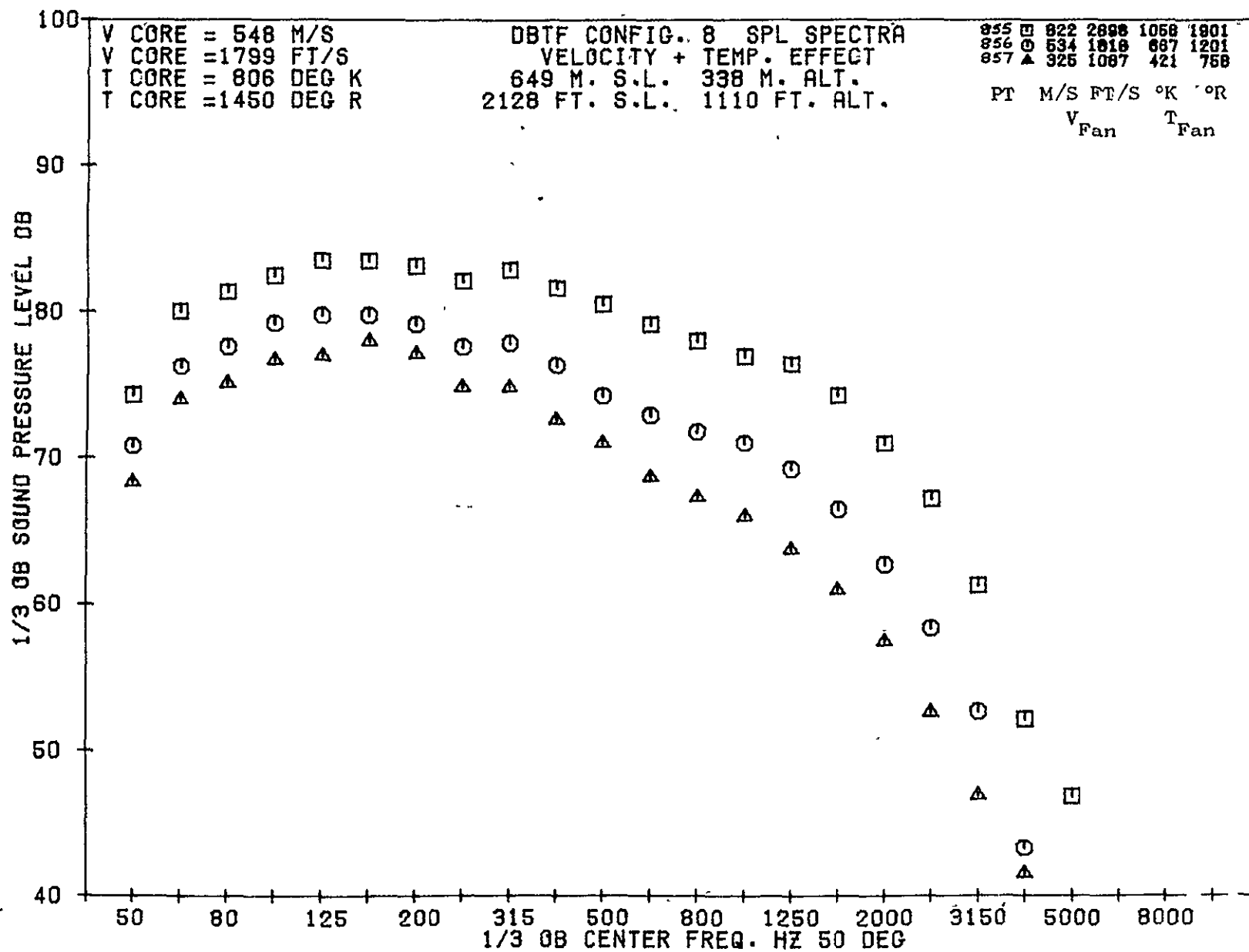


08/20/75
5R524-001

79 BURCH A.

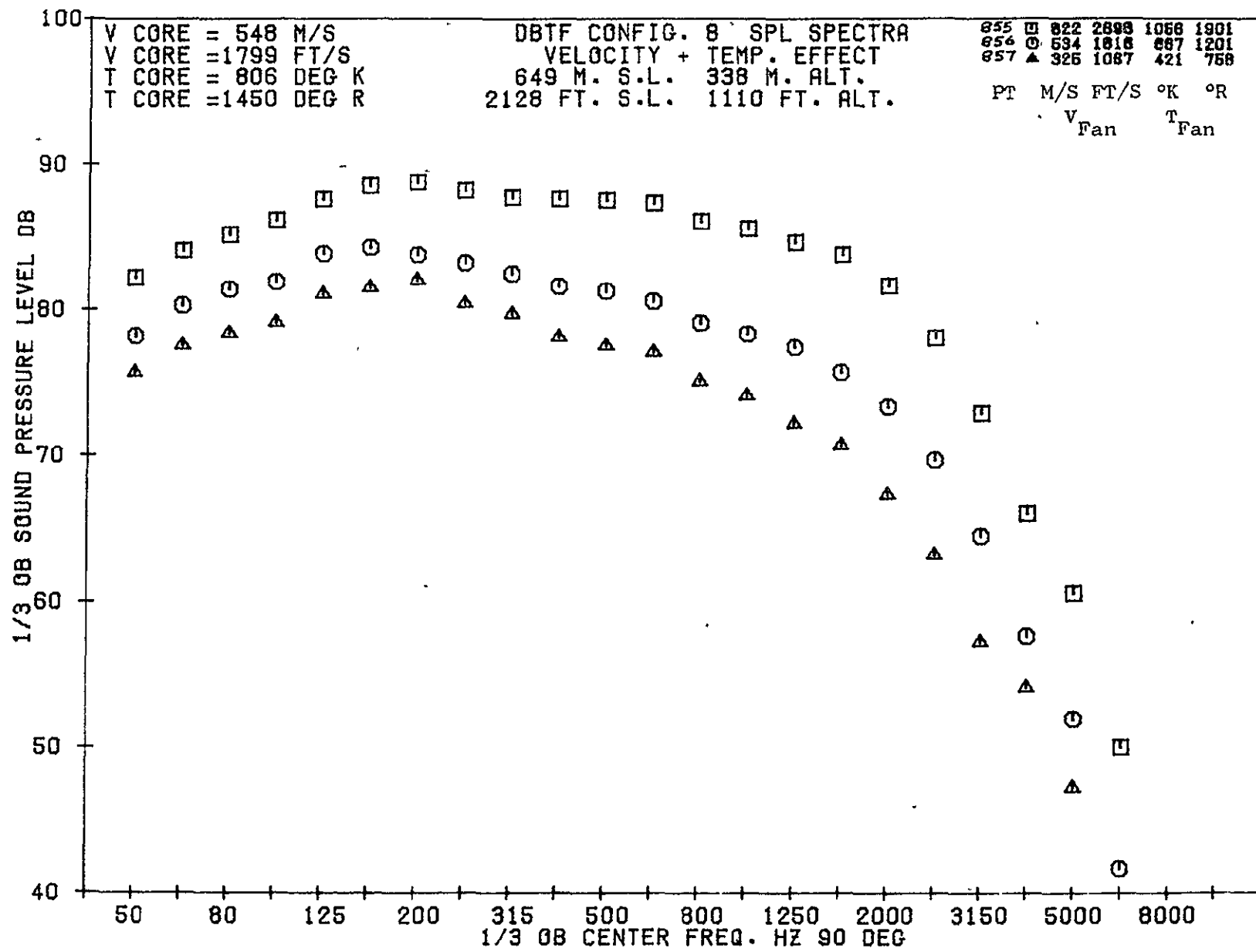
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1592



08/22/75
 ER682-001

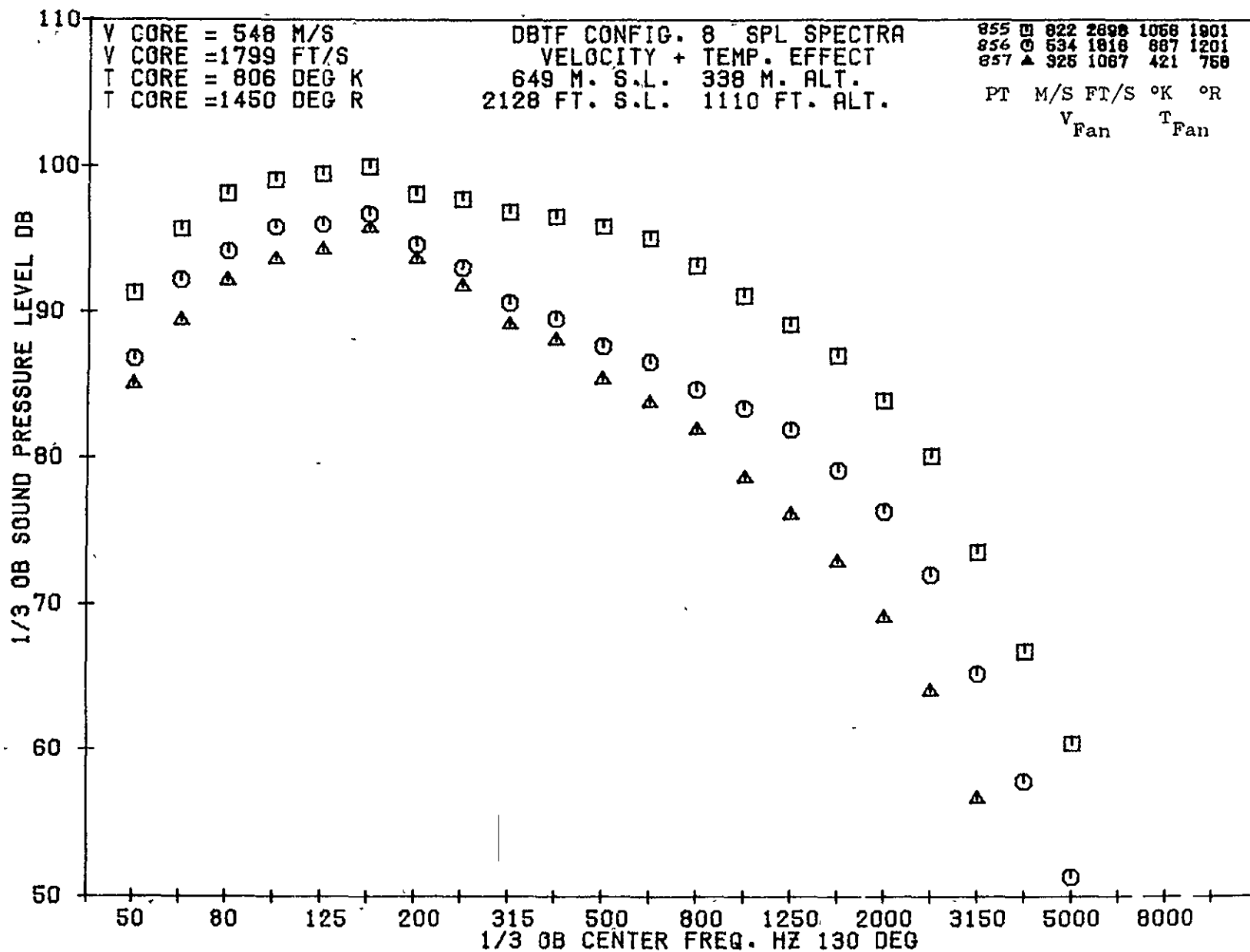
79 BUR A.



08/22/75
5R682-001

79 BURCH A.

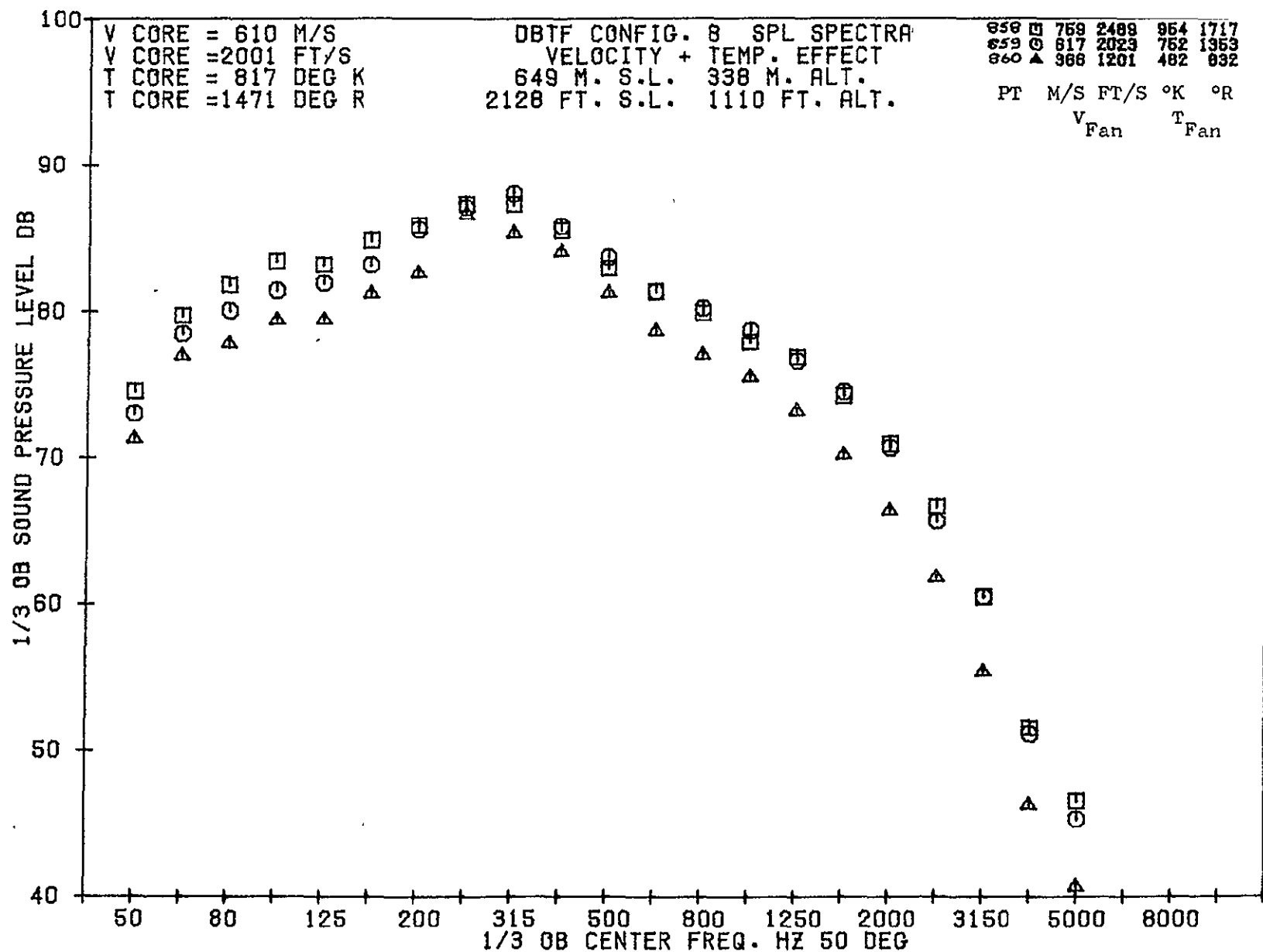
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08/22/75
5R682-001

79 BURDORF

1595

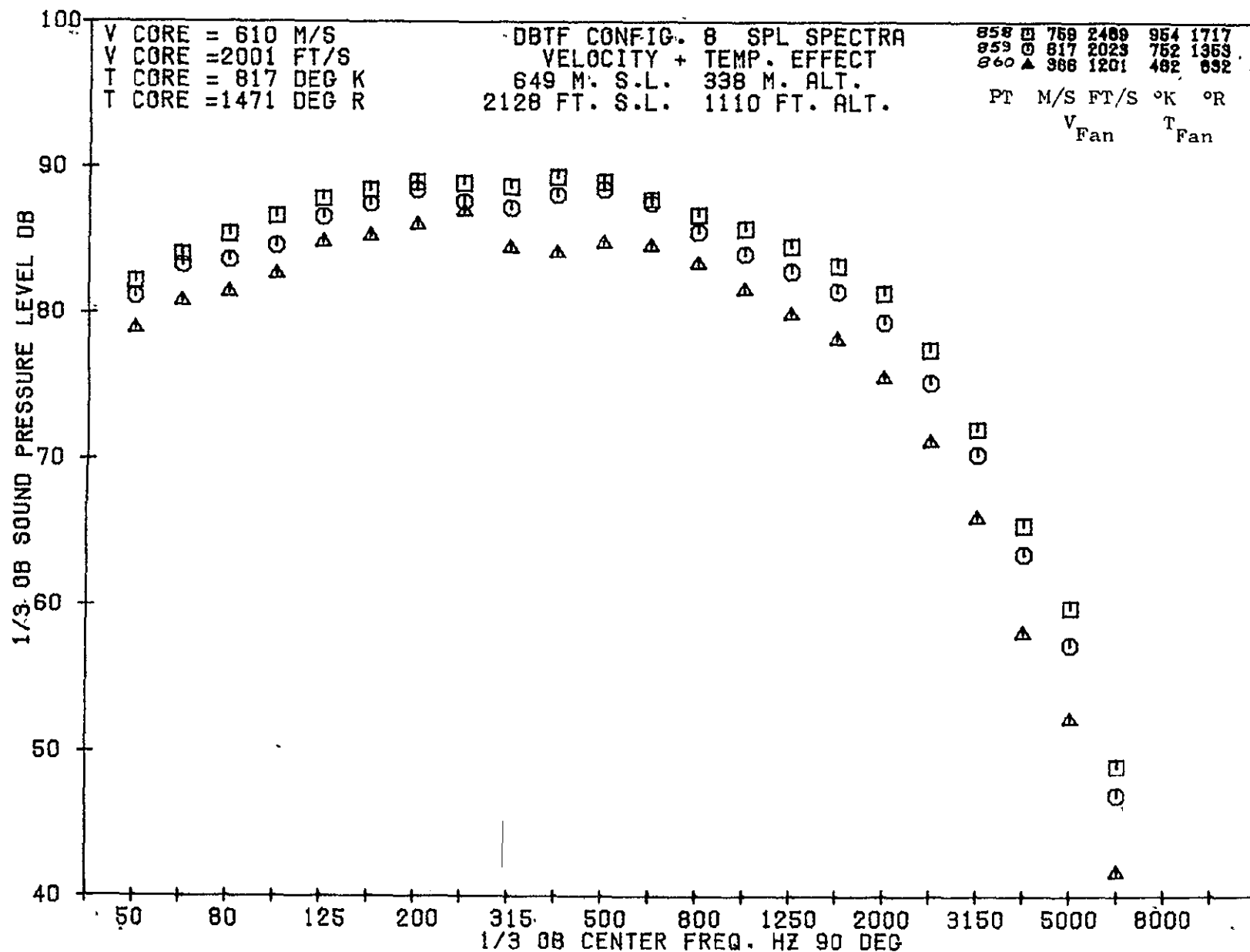


08/20/75
5R524-001

79 BURCH A.

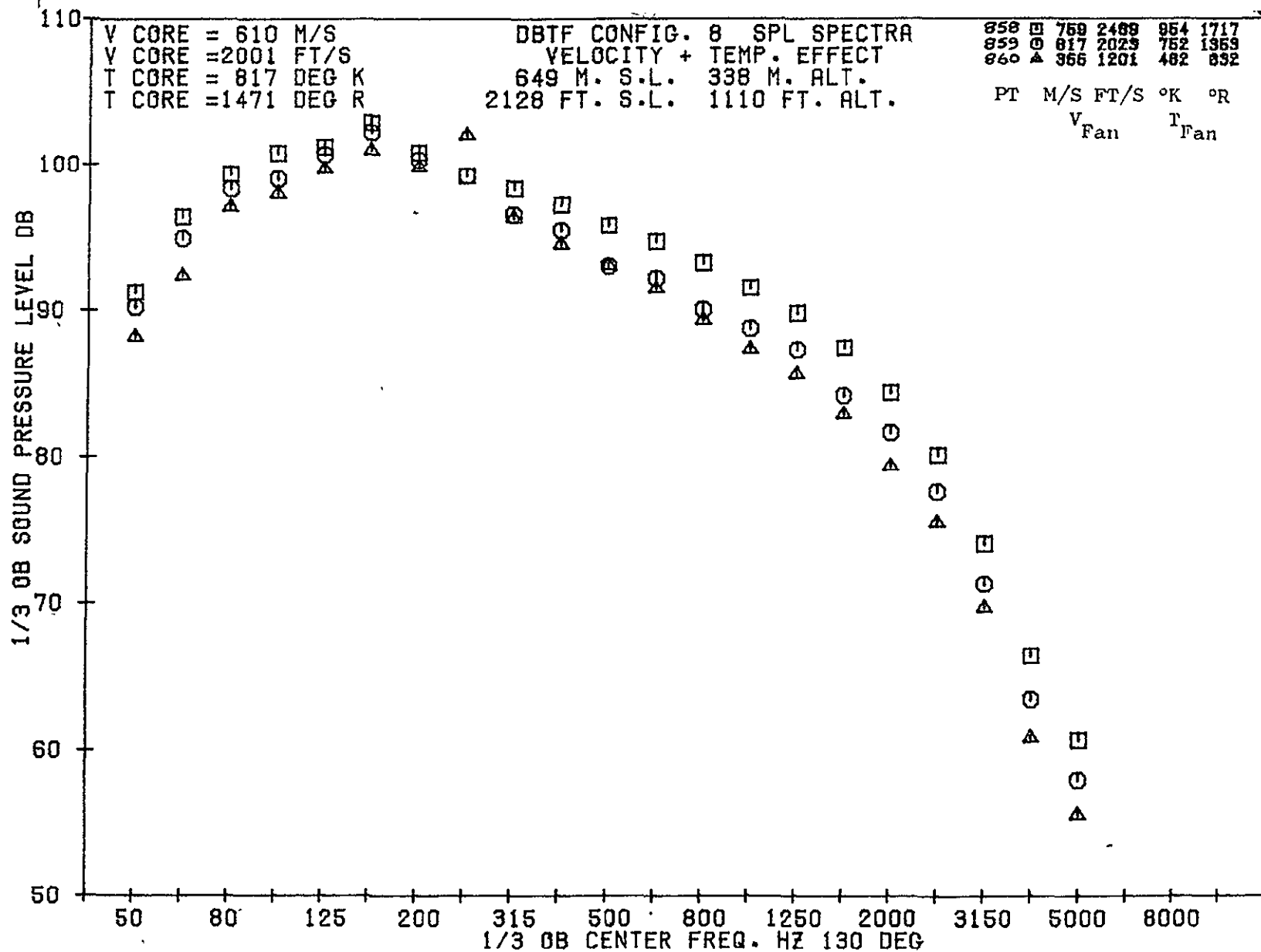
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11-352



08/20/75
5R524-001

79 BURC

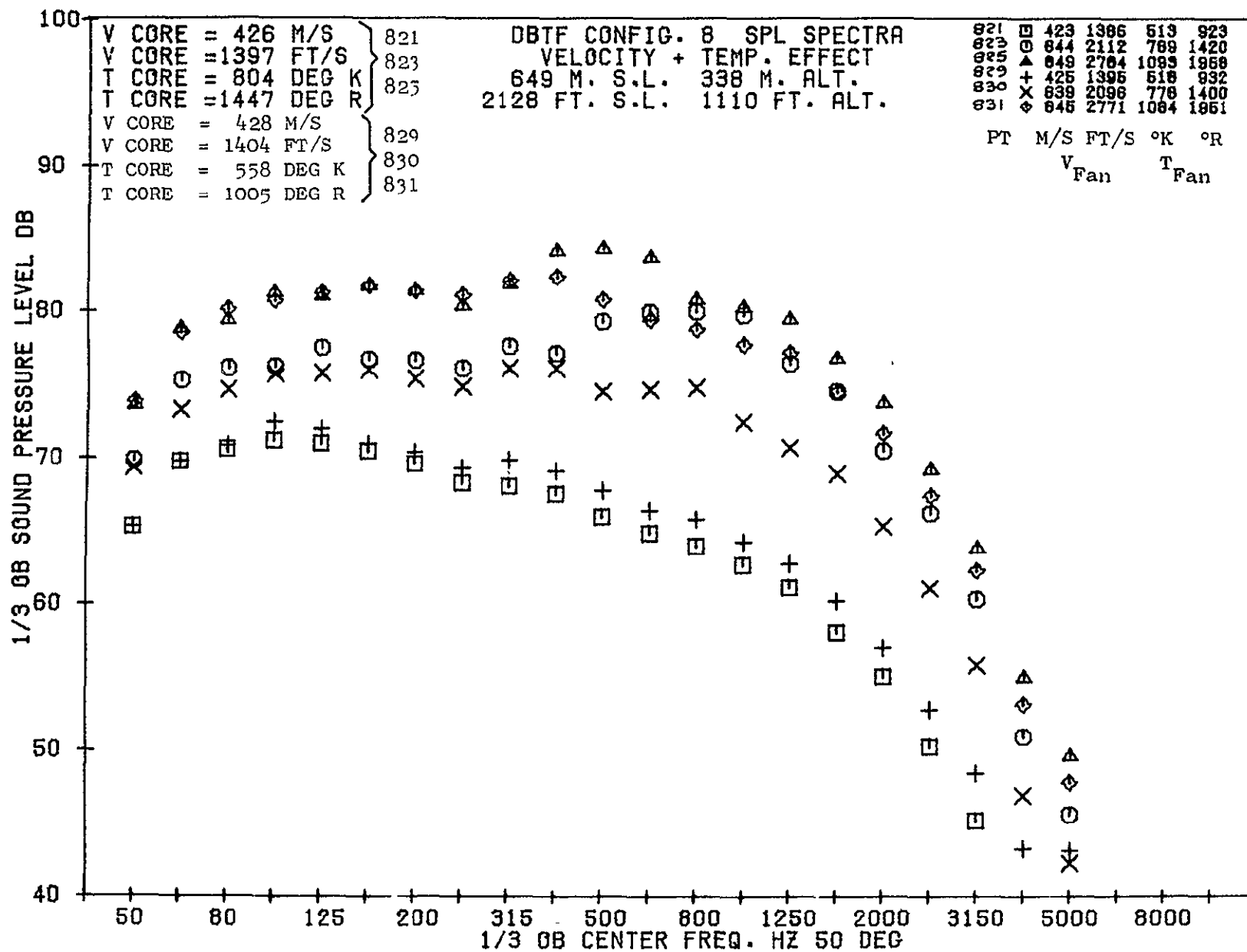


08/20/75
5R524-001

79 BURCH A.

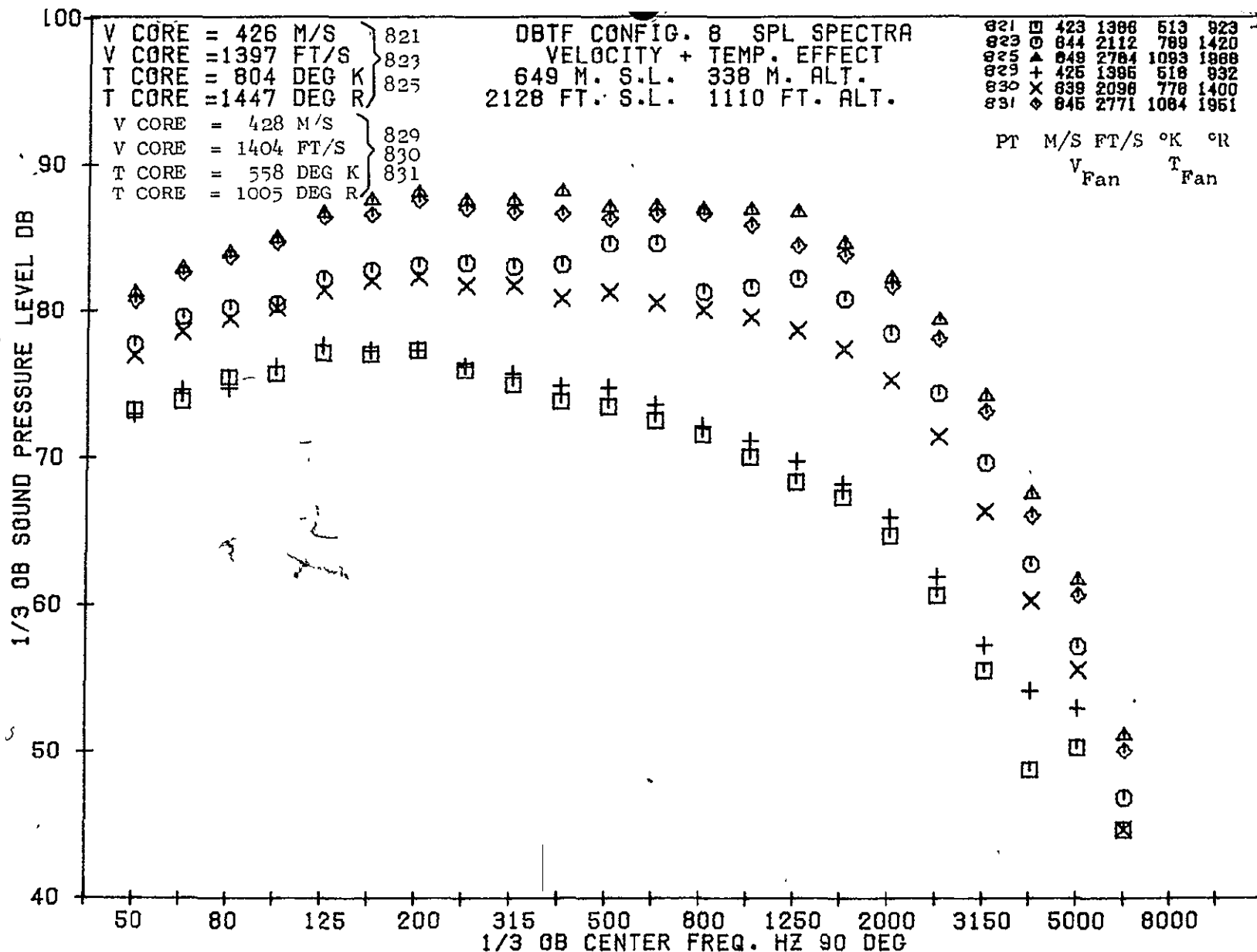
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1598

08/20/75
5R524-001

79 BURGLA.

1599

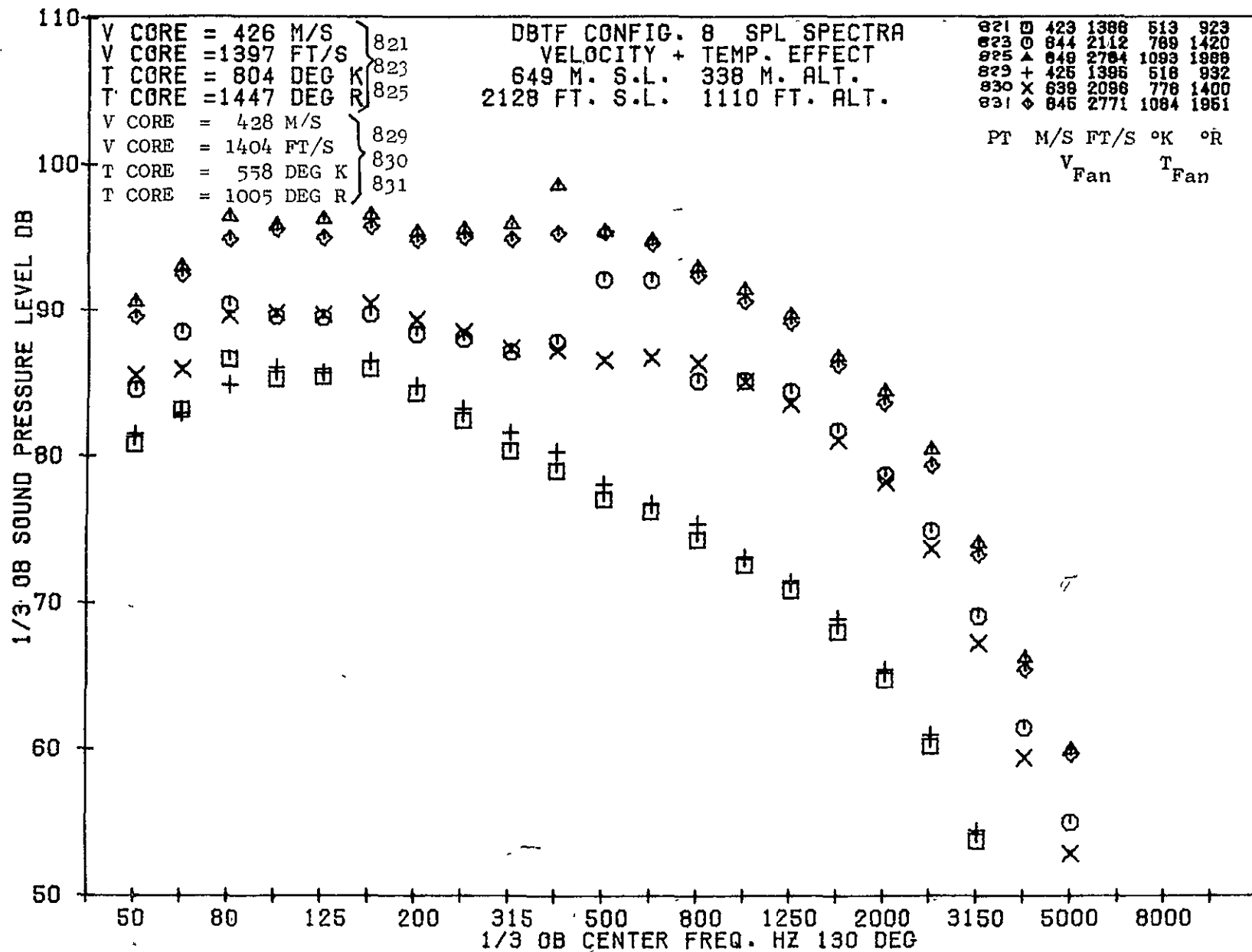


08/20/75
5R524-001

79 BURCH A.

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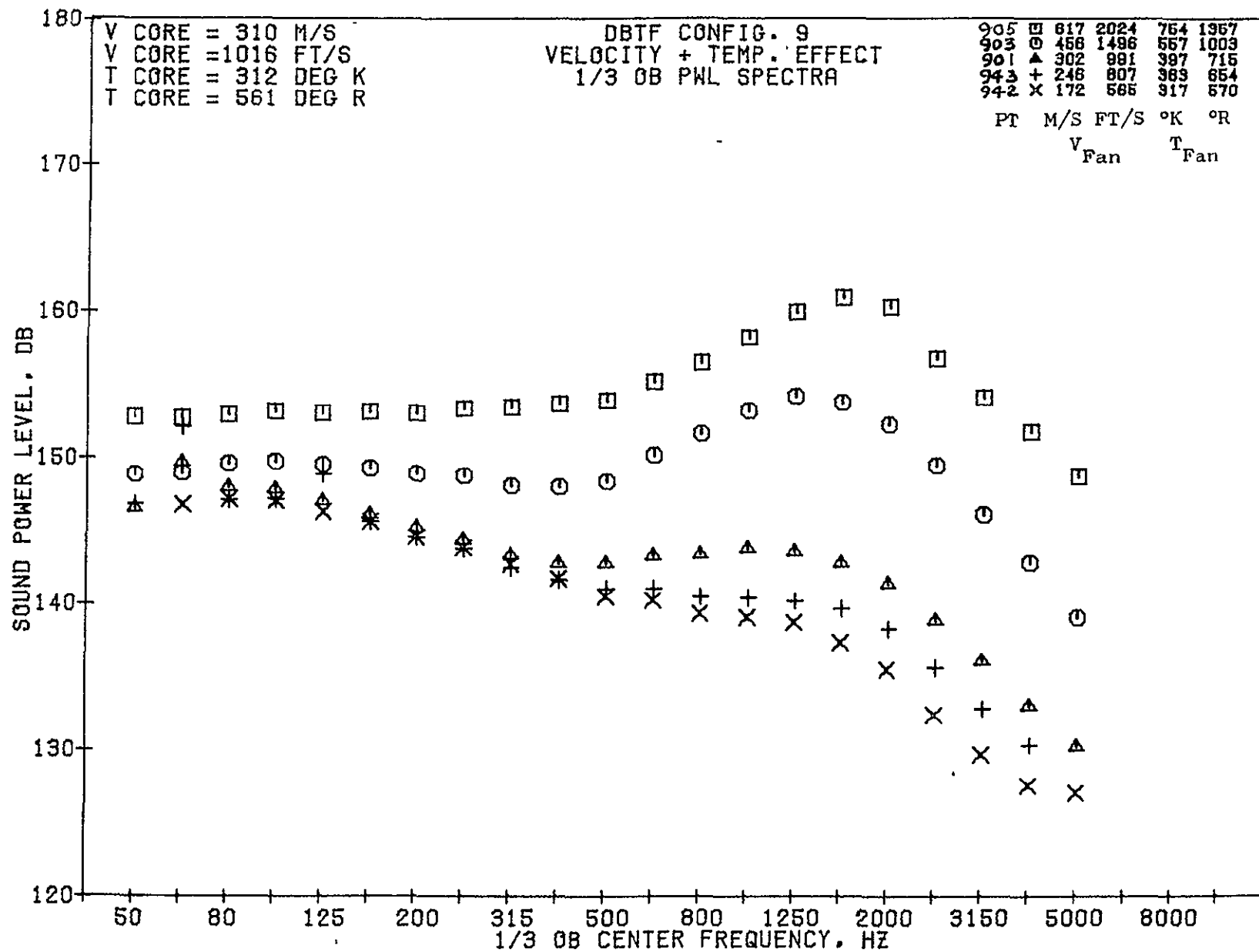
1600



08/20/75
5R524-001

79 BURCH A.

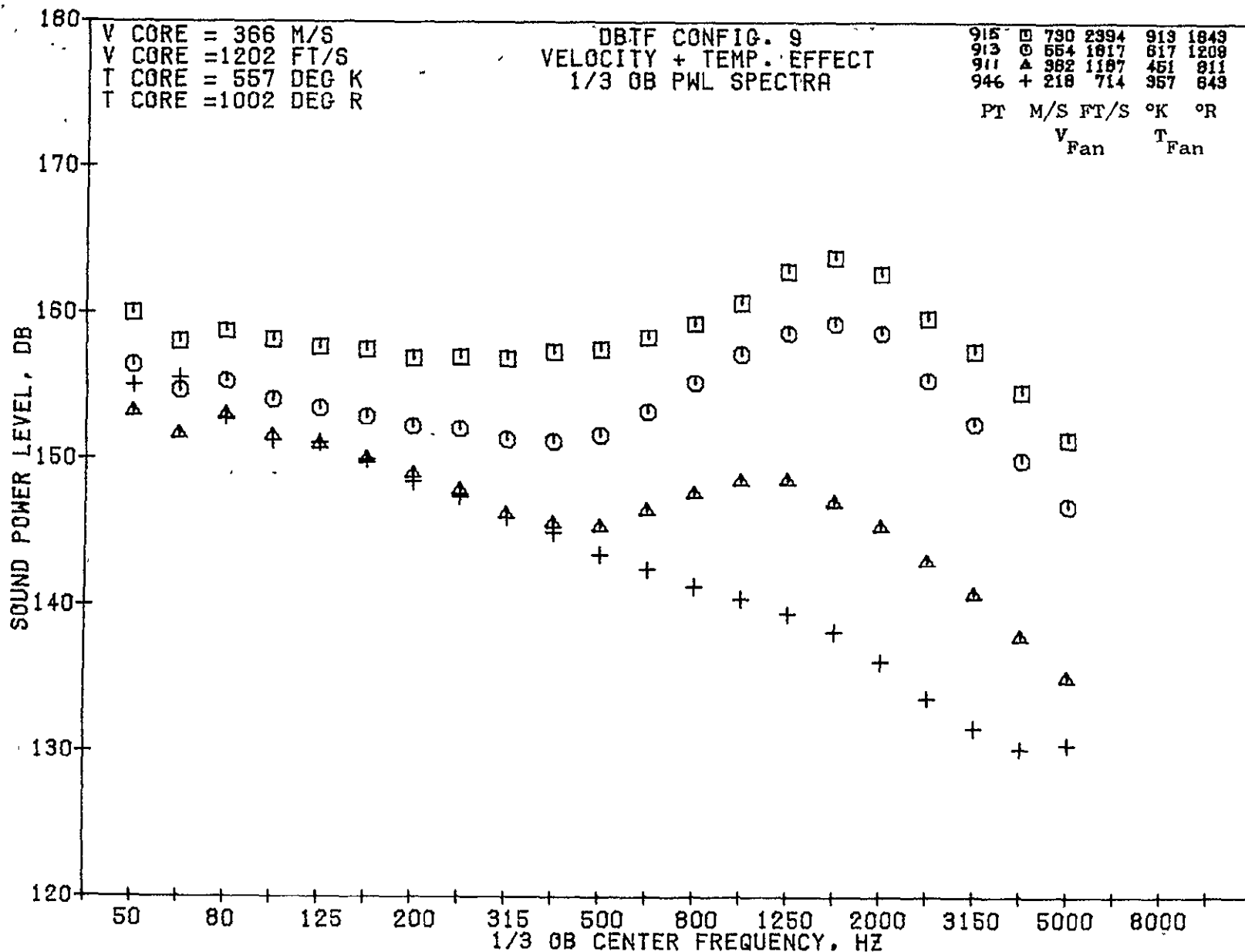
1358



08/18/75
5R266-001

79 BURCH A.

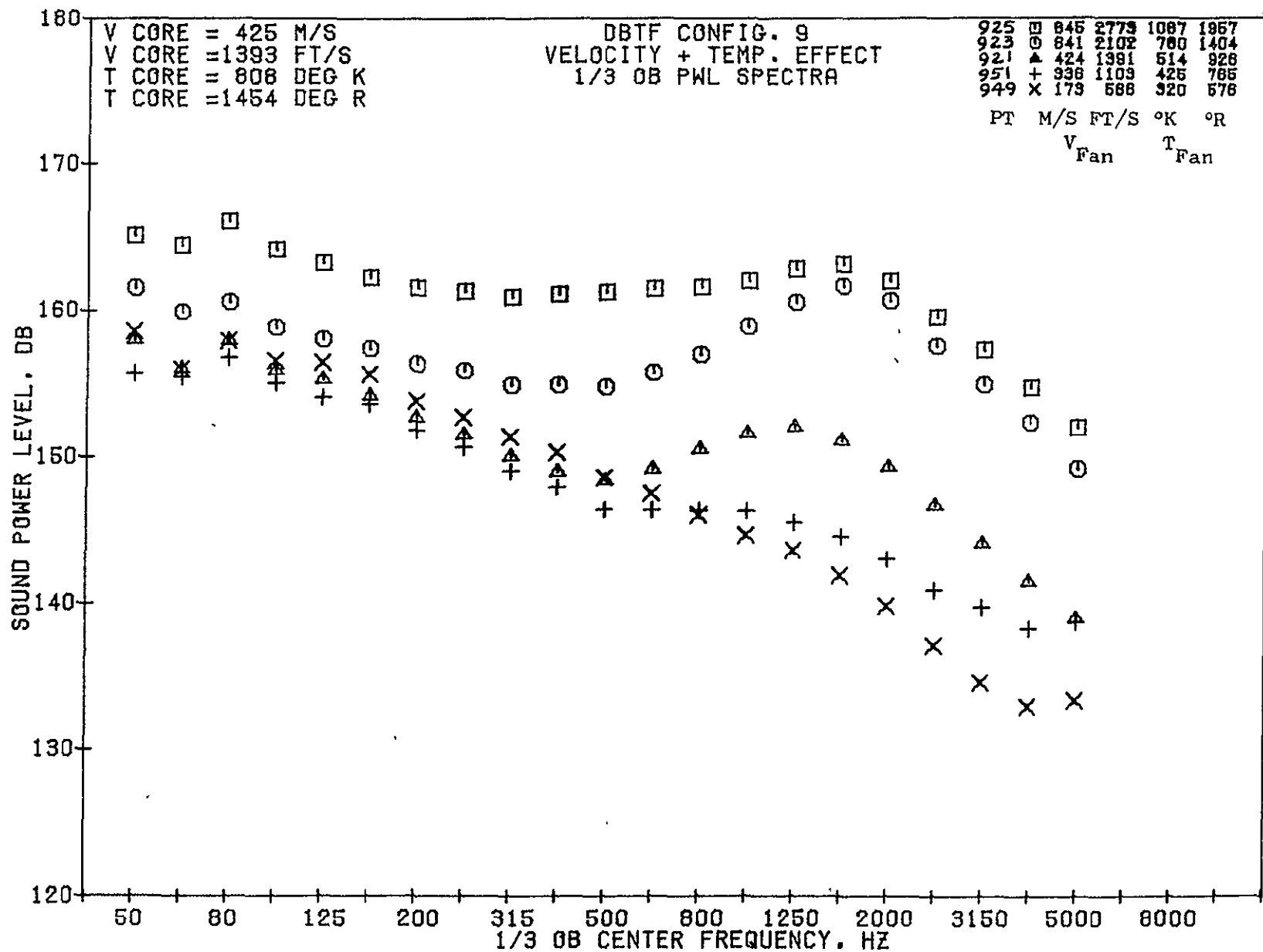
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08/18/75
5R266-001

79 AIR A.

1603

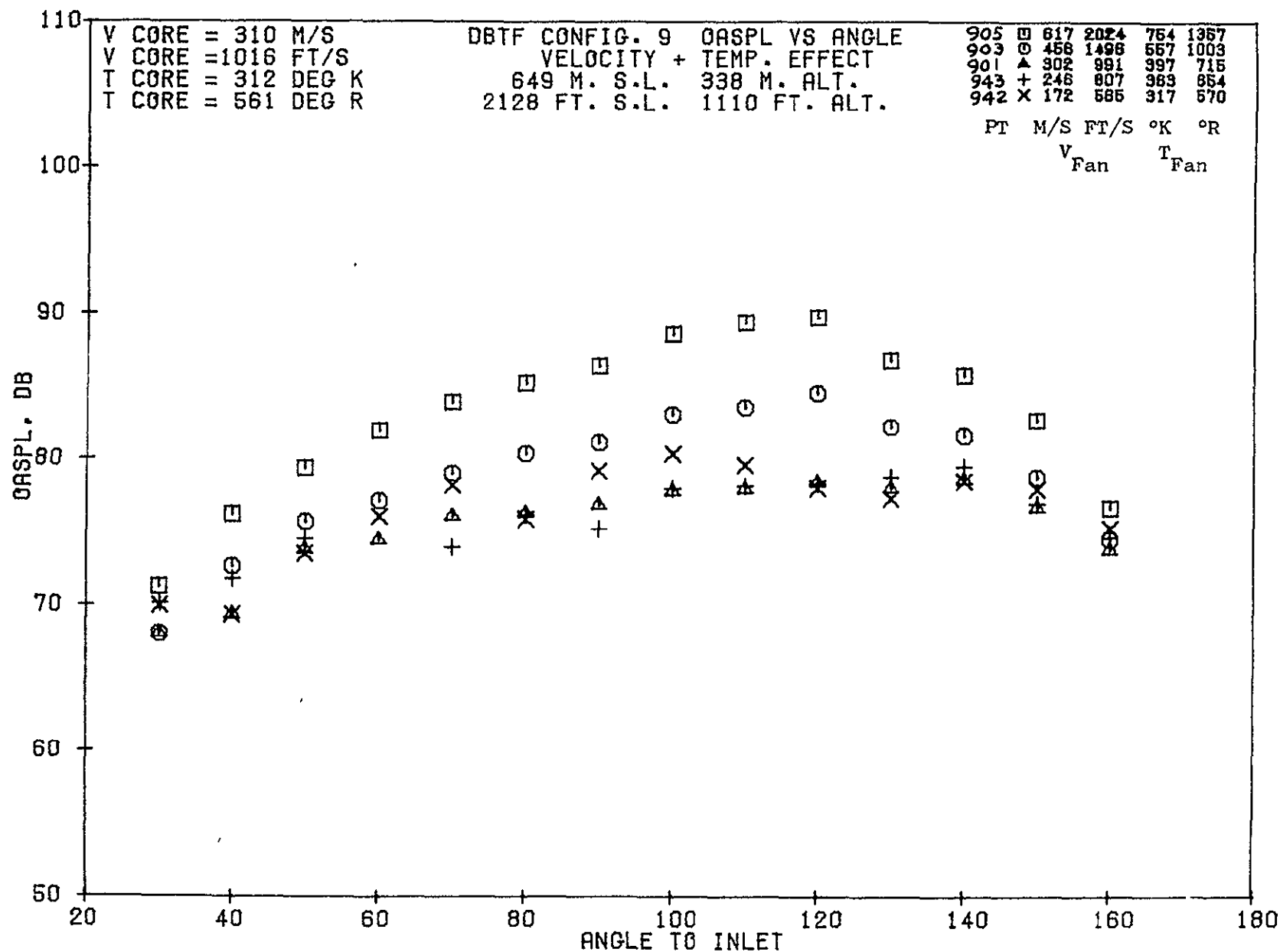


08/18/75
5R266-001

79 BURCH A.

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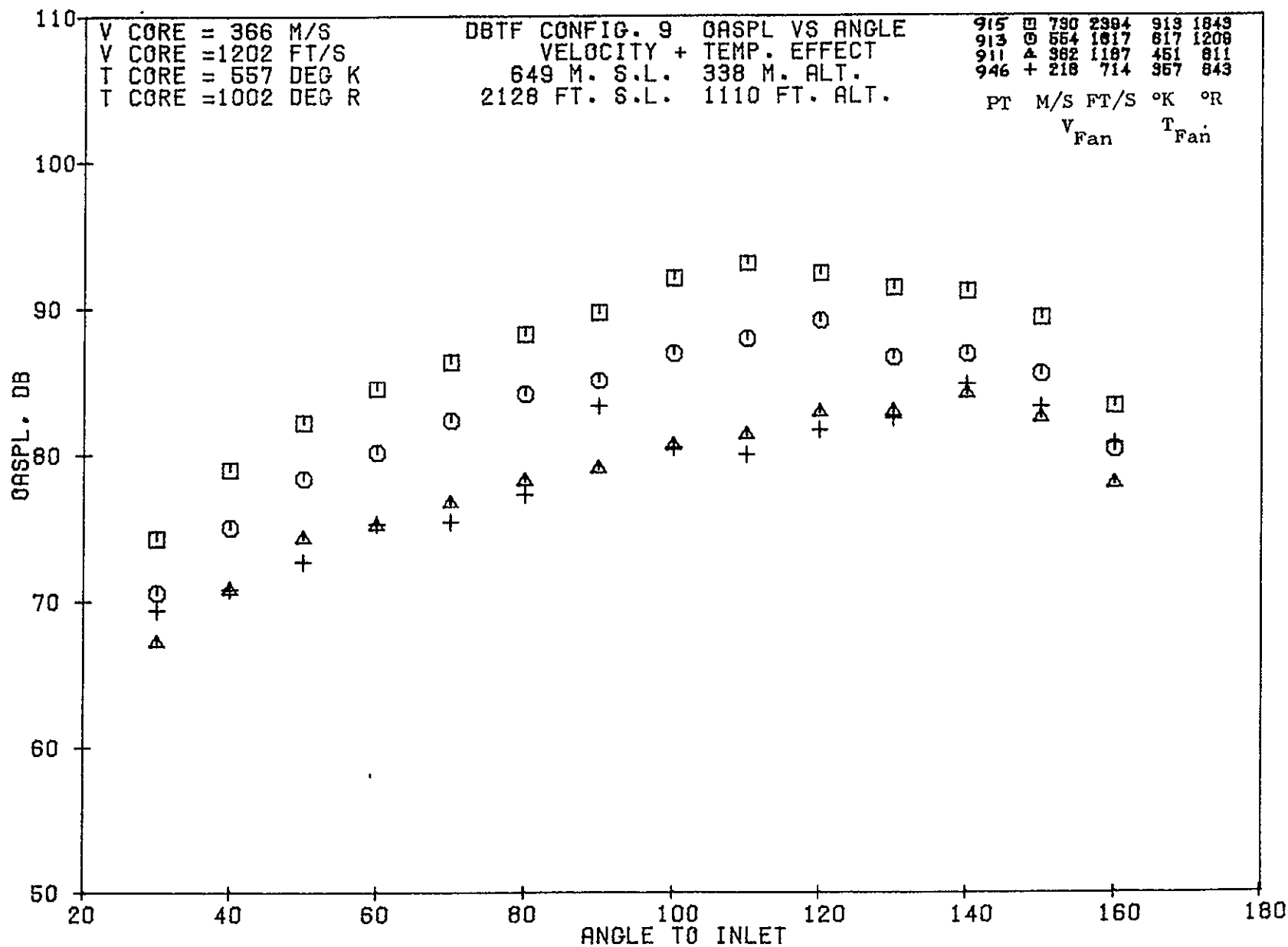
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08/18/75
5R266-001

79 AIRCRAFT A.

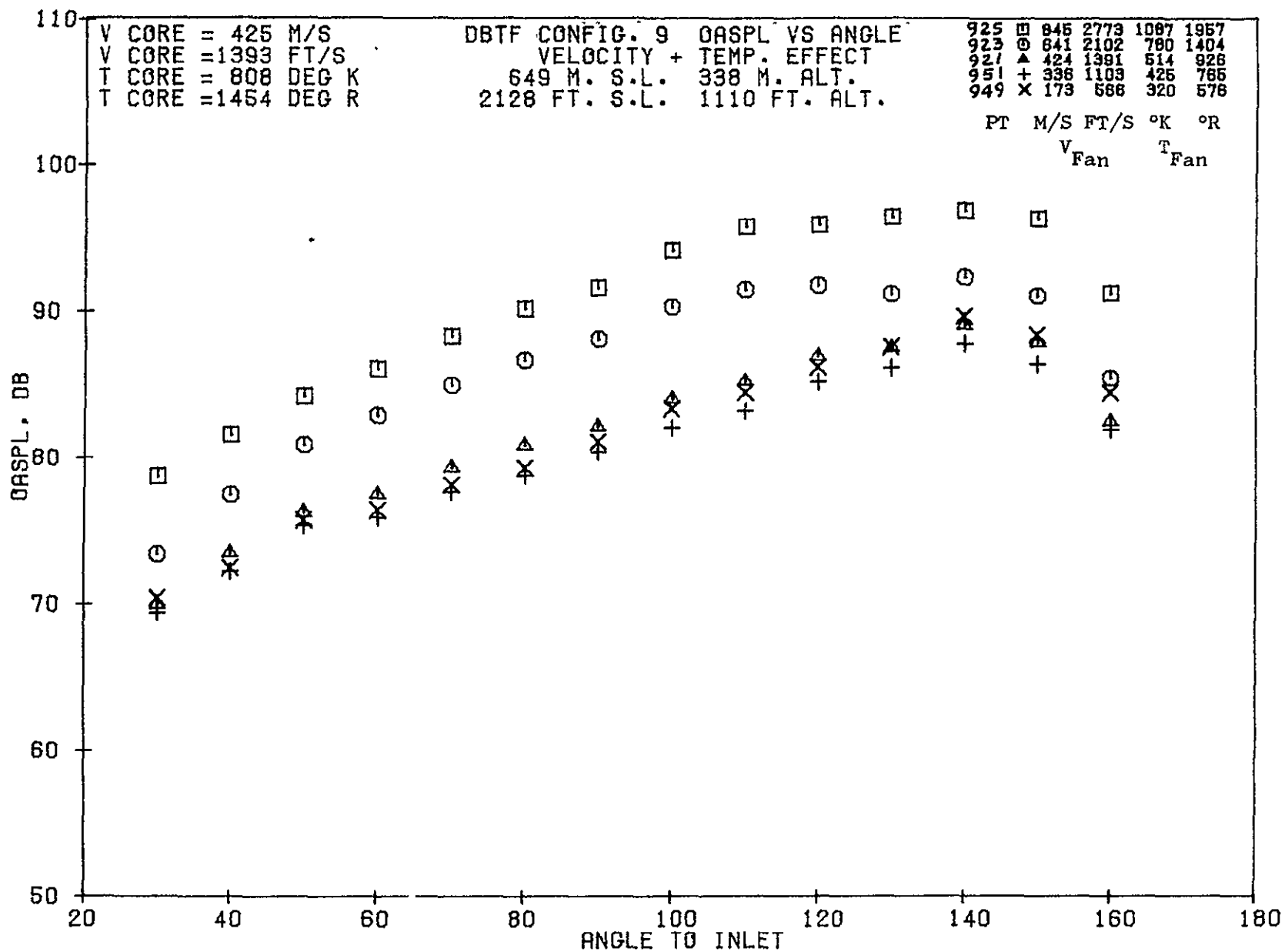
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08/18/75
5R266-001

79 BURCH A.

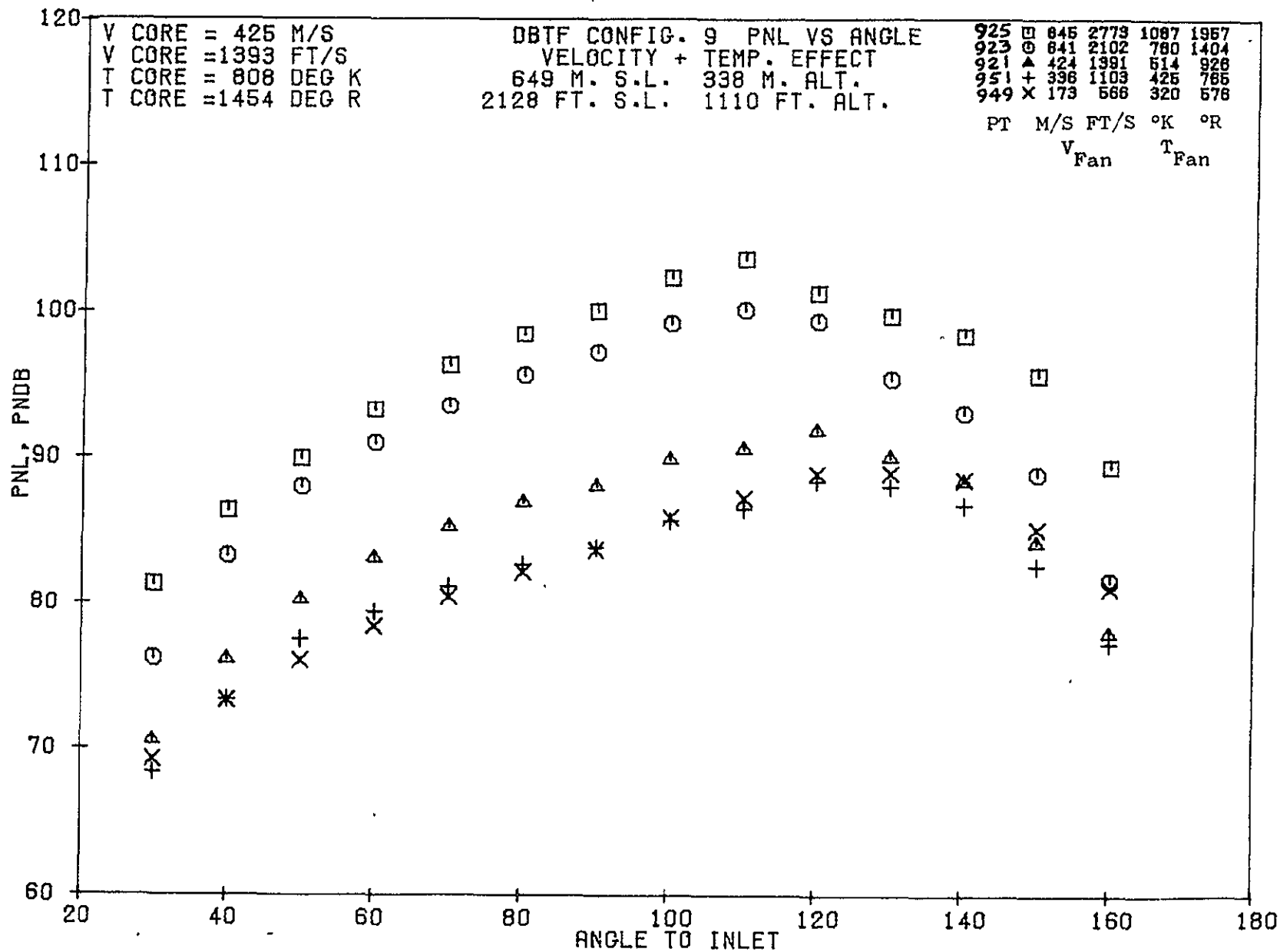
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08/18/75
5R266-001

79 BUR

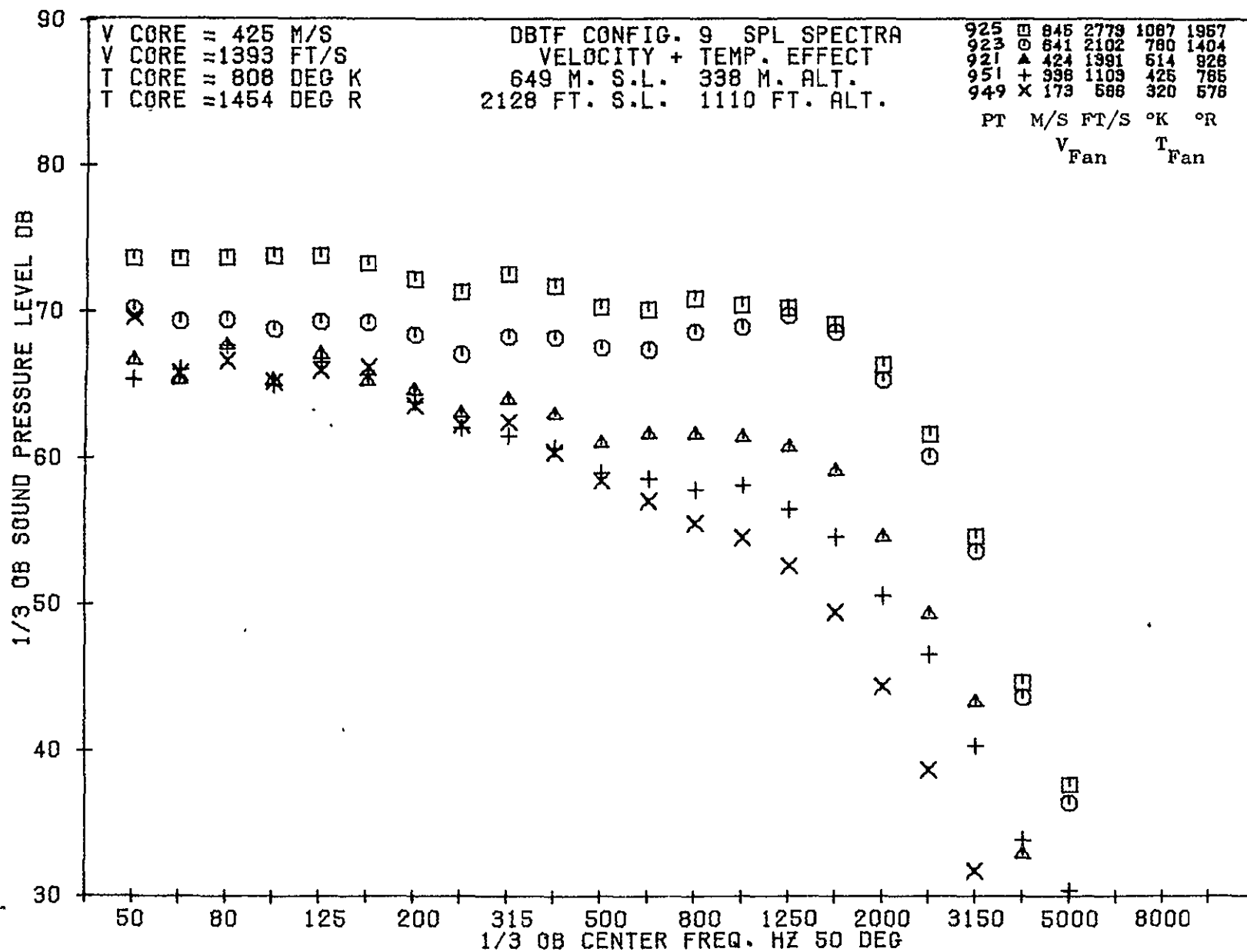
1607

08/18/75
SR266-001

70 BURCH 0

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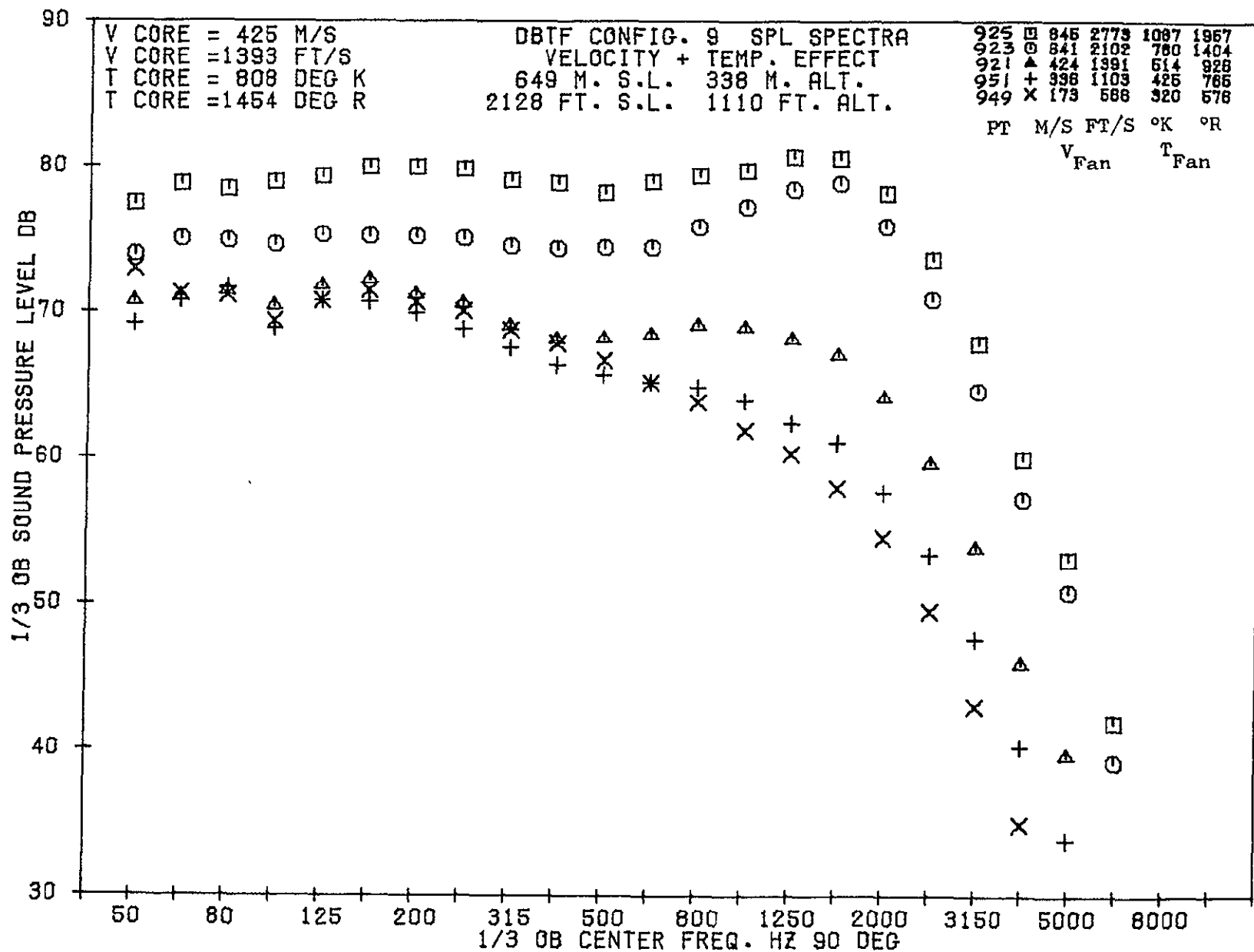
1608



08/18/75
5R266-001

79 BURC A.

16091

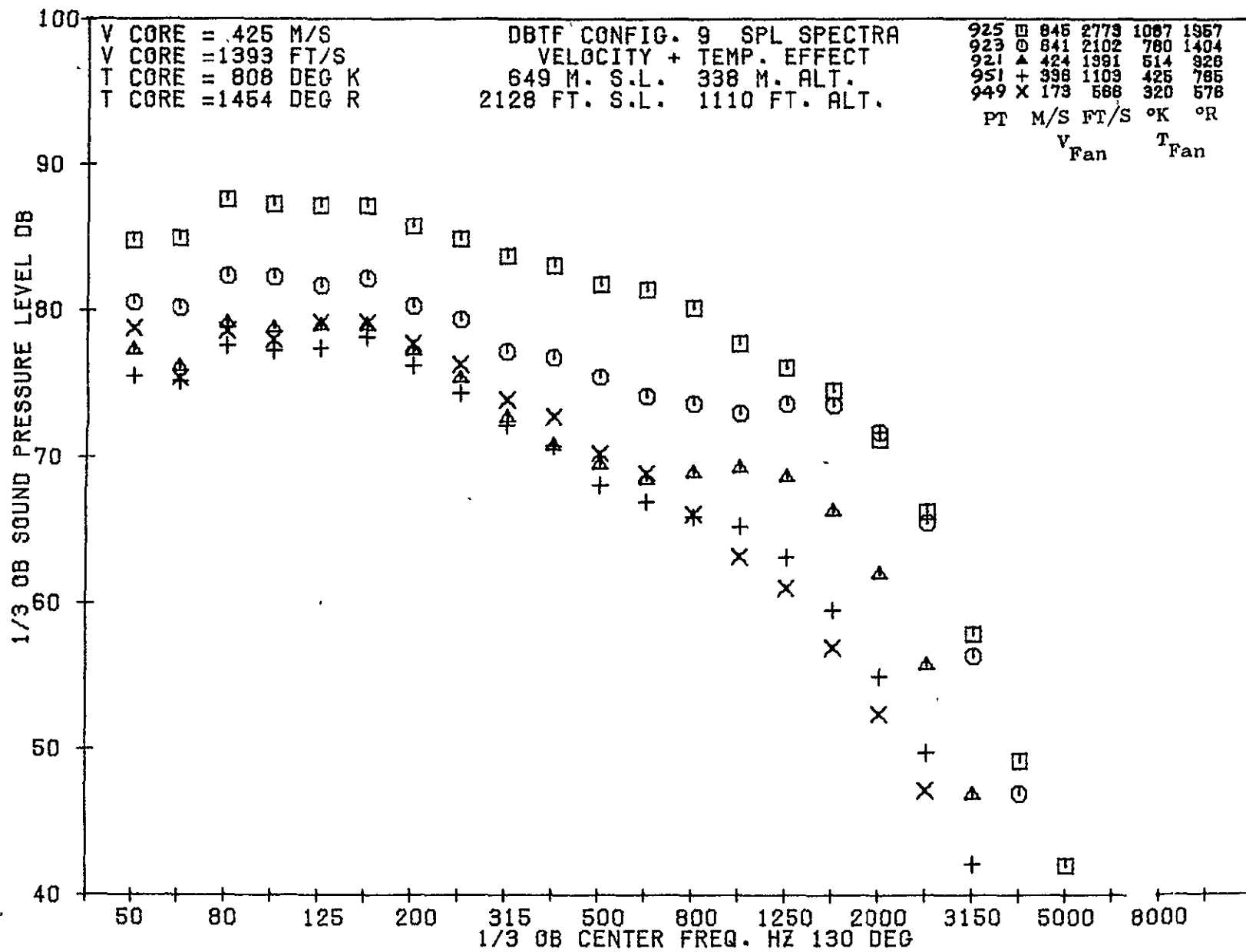


08/18/75
5R266-001

79 BURCH A.

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0191



08/18/75
5R266-001

74 BUREAU

5.0 ON-LINE NARROWBANDS

5.0 ON-LINE NARROWBANDS

The acoustic data was monitored during test with an on-line spectrum analyzer. Any unusual tones were investigated. The narrowbands were documented in graph form using an X-Y plotter.

The following graphs are for Model #8, the coannular, coplanar acoustic configuration. This test model exhibited lip tones when the core and fan velocities were matched and shock tones at pressure ratios above critical. The tones are evident in the 1/3 Octave band spectral plots and the narrowbands verify the actual frequencies at which the tones occurred.

The other test configurations did not have significant tones evident and the 1/3 octave band plots have similar characteristics to the narrowbands. The narrowbands were recorded, but are not included in this document.

4 APR 1975

RDC 1 P1 ECL

134°

AMPL 90° ±10
130° ±10
ANAL ±10

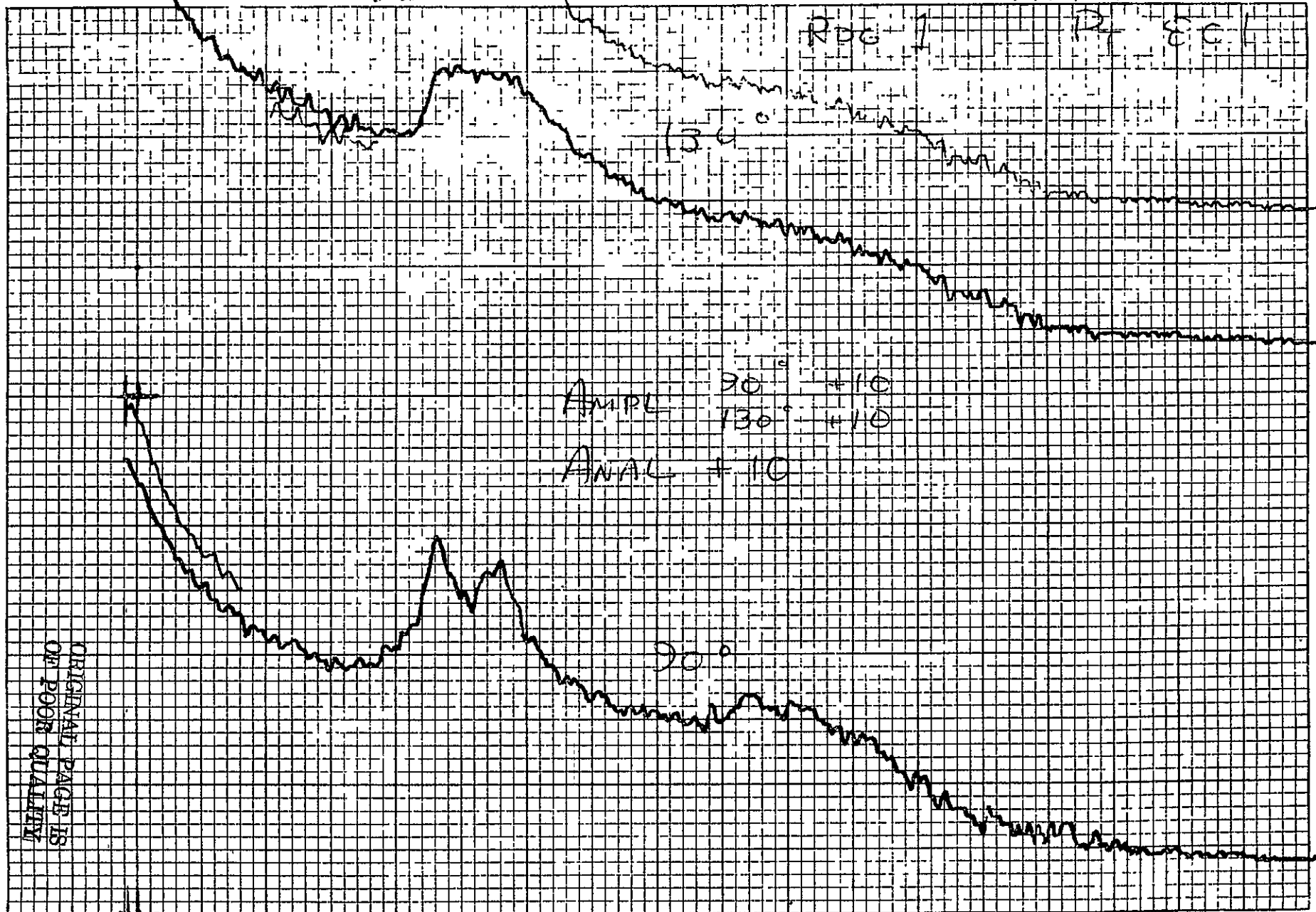
90°

1612

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5-2

0 10 20 30 40 50 60 70 80
KHz



4-7-75

30.9 KHz

Row 5

PT 8103

1613

Row 6

90

430

133

723

Row 6

410

300

5-3

KHz

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4-7-75

RDJ B

PT 805

PLOTTER
PROBLEMS

R.M.P.

ANAL. TRC

3.0

KHz



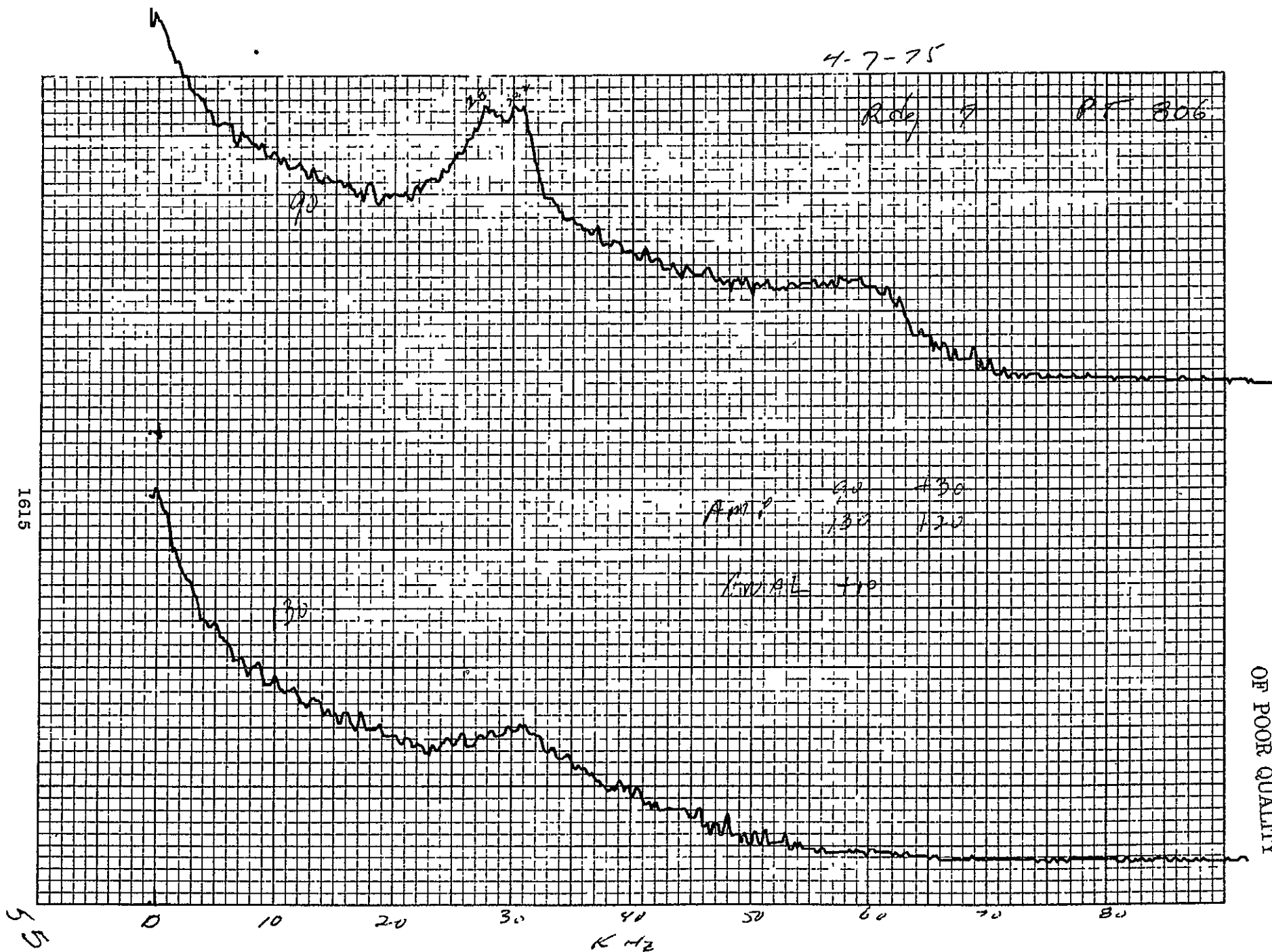
1614

5-4

4-7-75

Rdg 7

PT 806



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4-7-75

12/2/88

17808

A km ✓

90 1 20

133 170

12-12-14

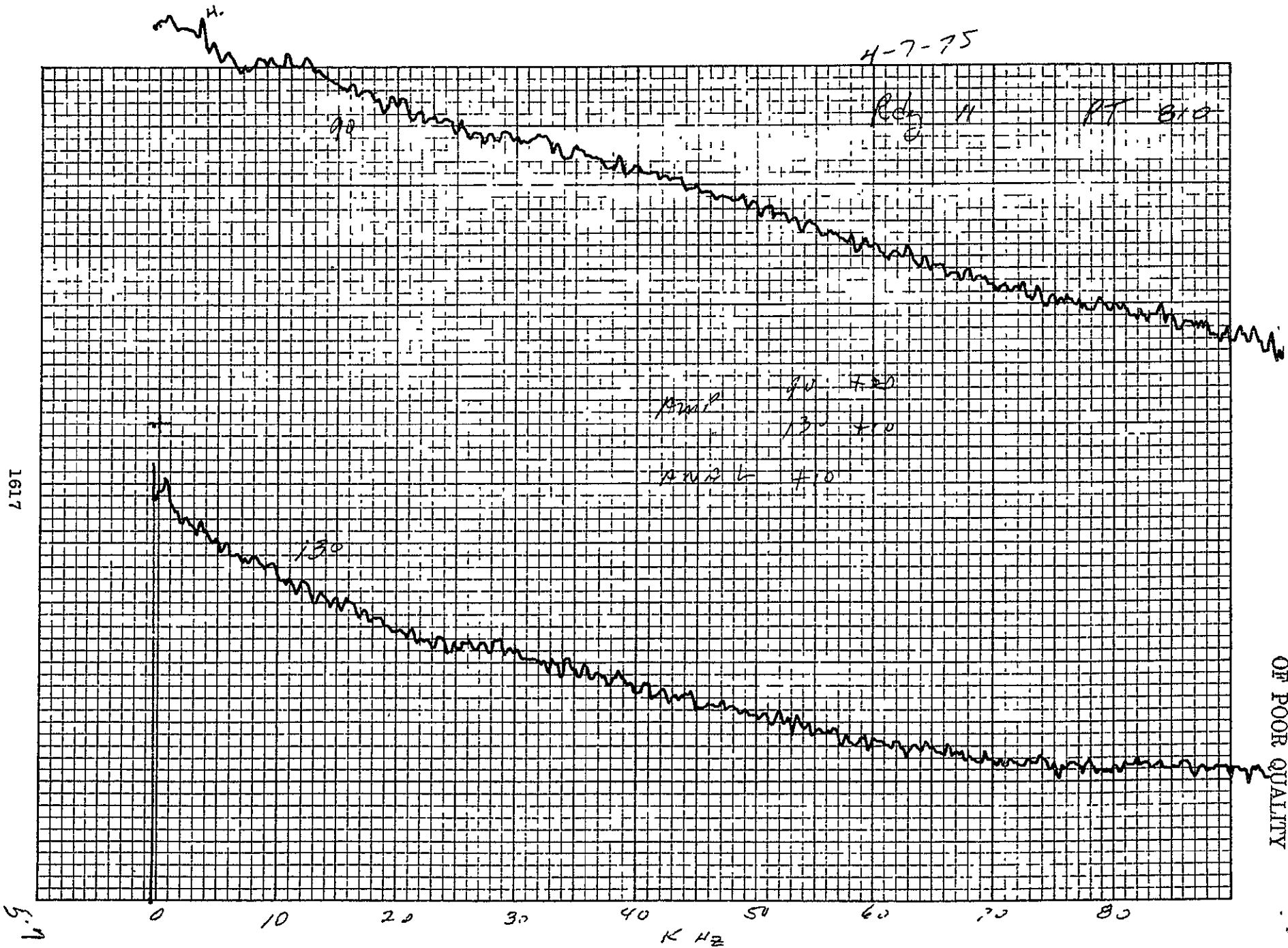
7-12

730

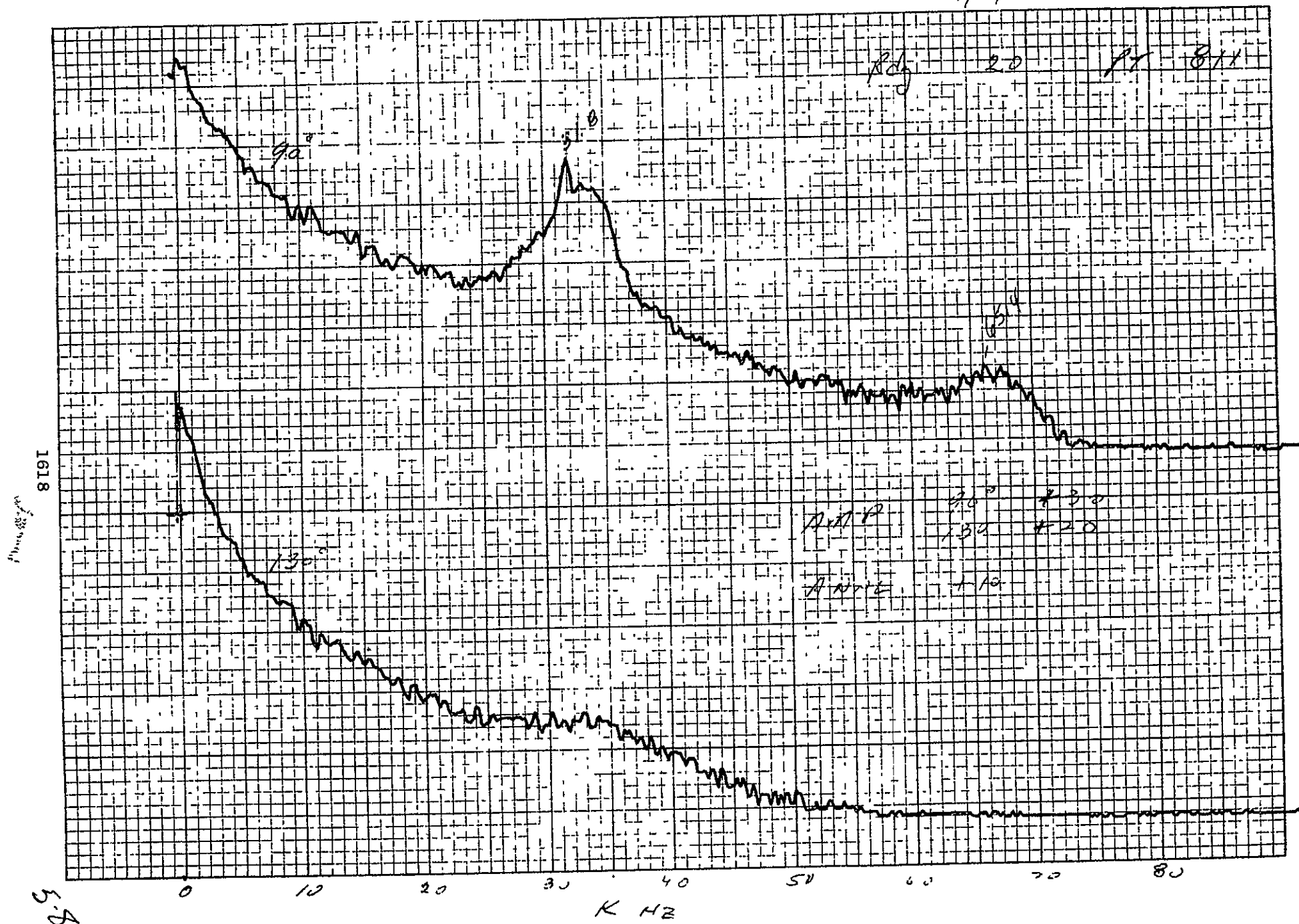
1616

 $K H_2$

5.

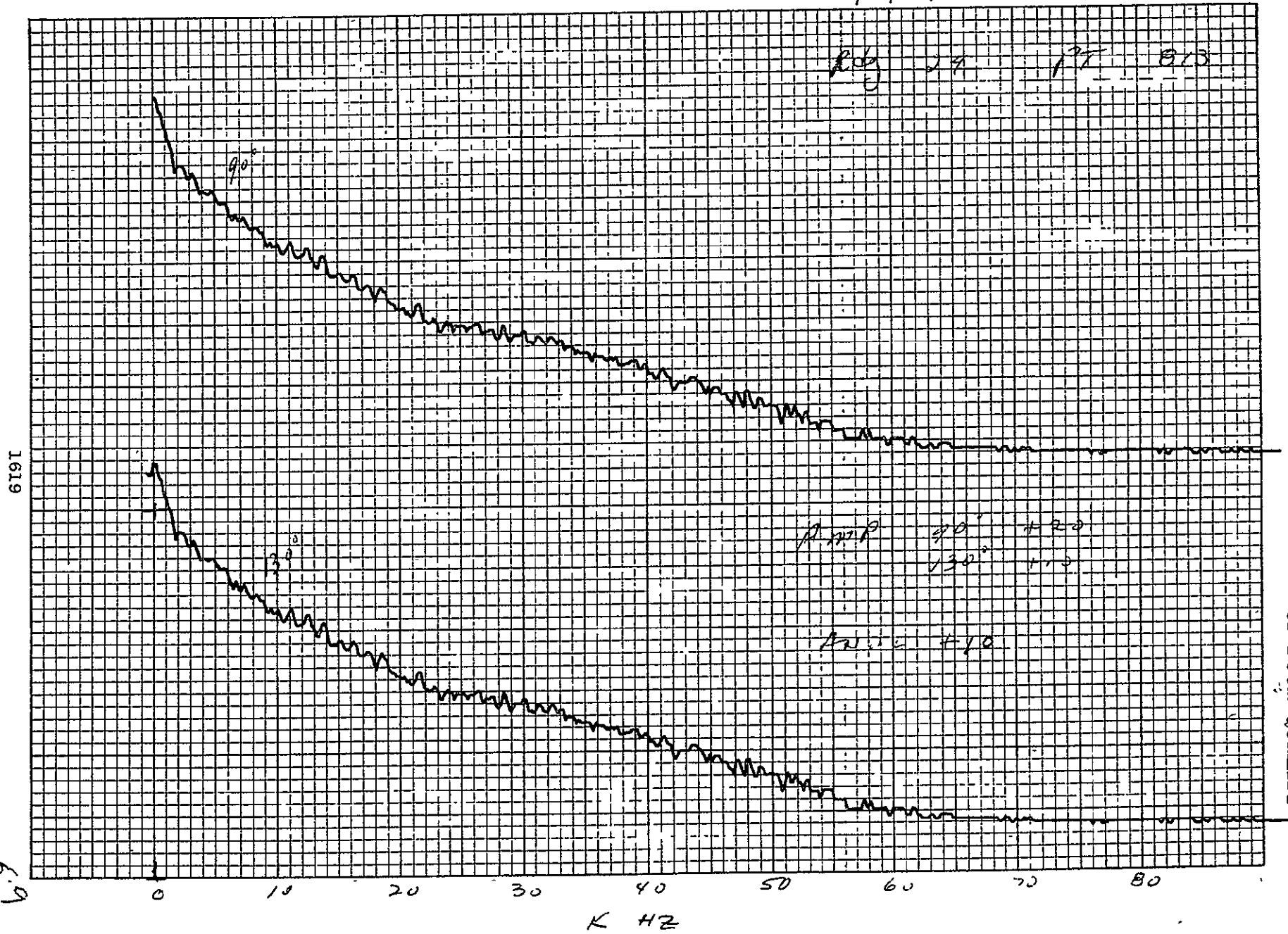


4-7-72



4-7-75

Fig 29 PT 813



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4-7-75

Rd

28

PF

815

1620

5.10

90

3.6

130

HAAP

91°
130°

410
410

HAAP

410

K 1/2

4-7-75

Fig 28 815

ADMR 13- 710
AUGRE 710

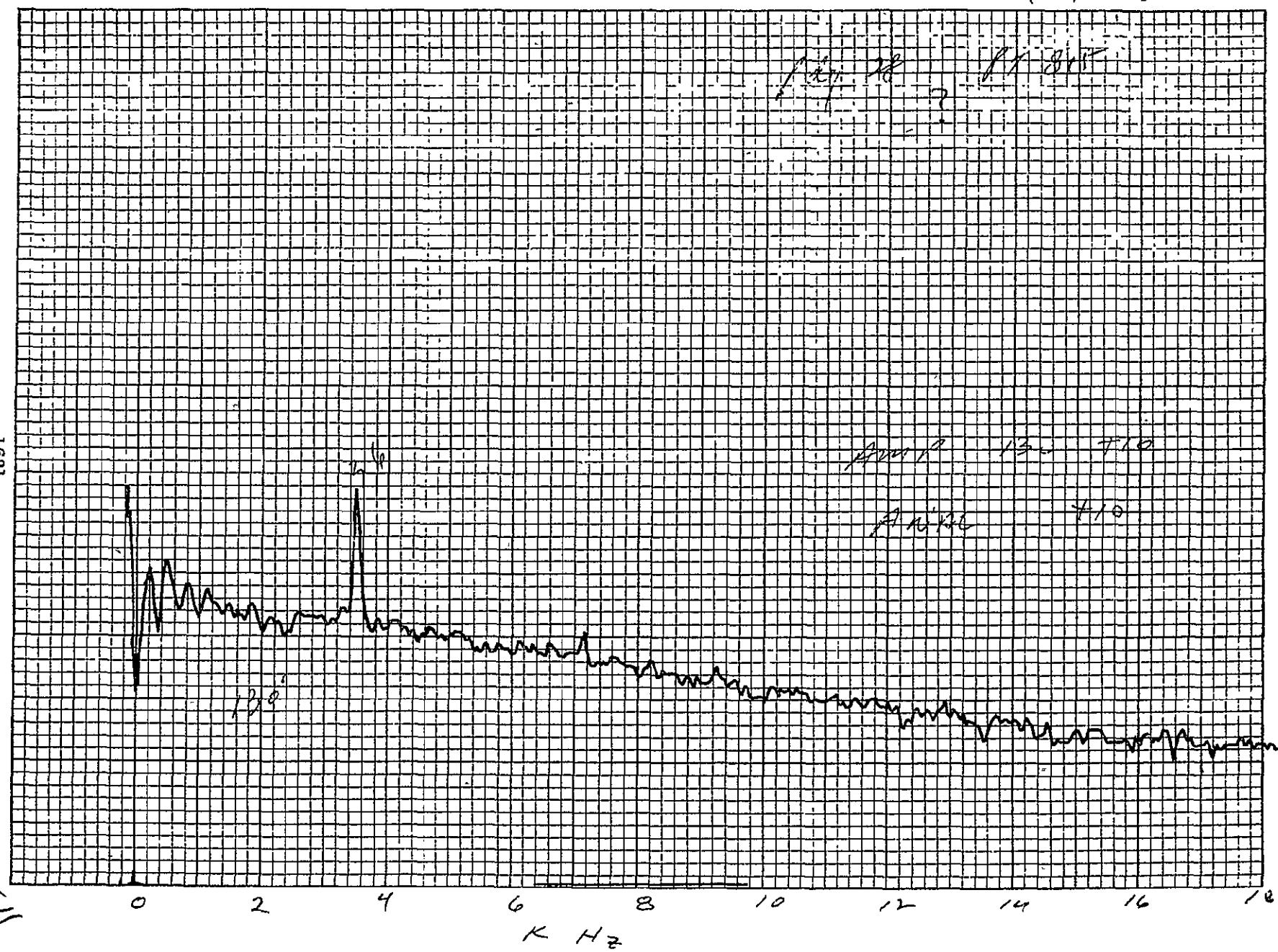
130

246

1621

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5-11



4-7-75

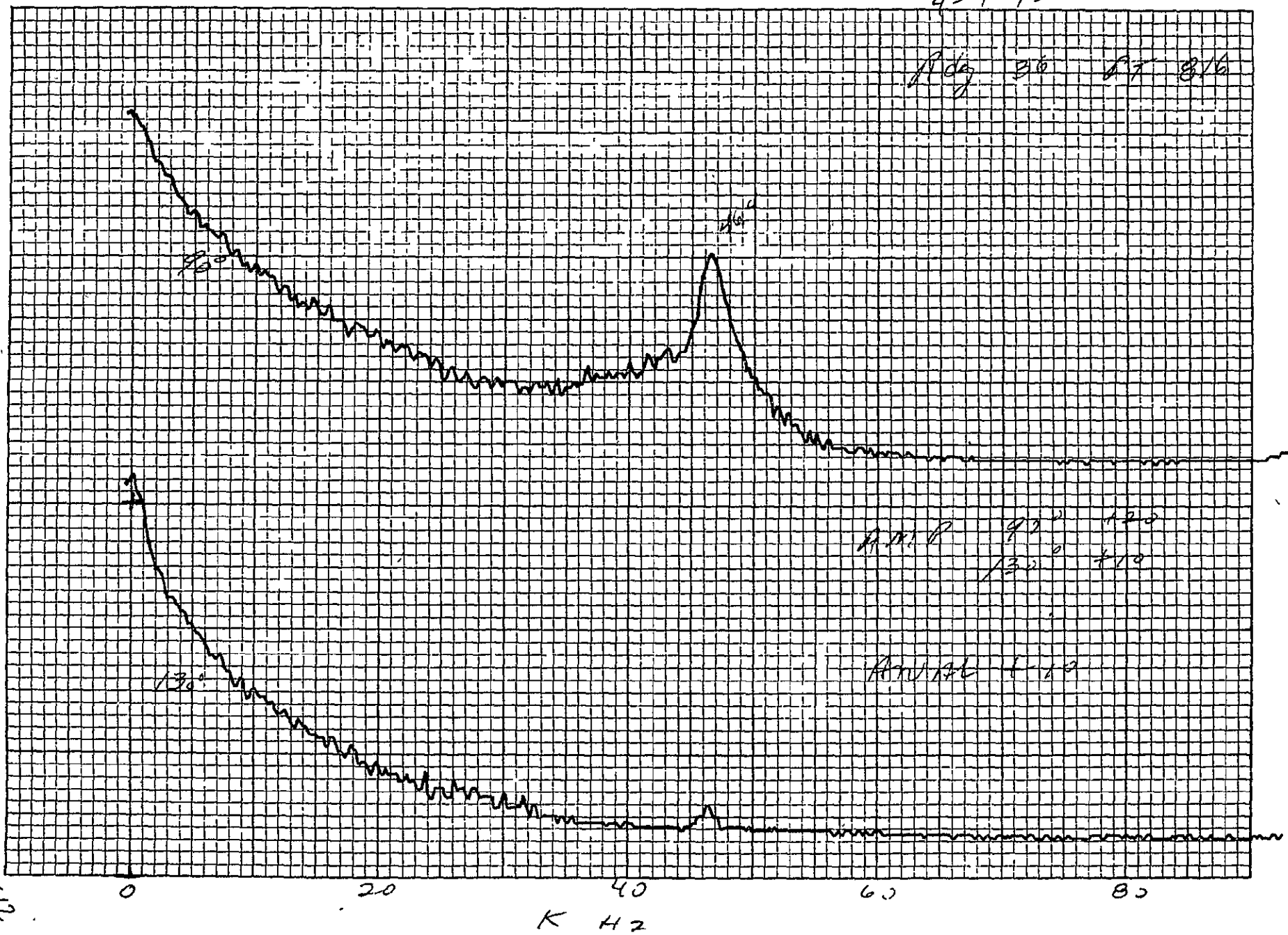
Adg 36 87 316

1622

AMP 90° 120
130° 110

AMP 110

5.12



4-7-75

Red 31

PT 818

20

AWP

90"

170

100

110

13 N/A

10

100

60

1523

5-1/2

K 1/2

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4 APR 1975

RDC 18

P_F 820

130°

90°

AMPL

90°

1110

130°

0

ANAL

T 20

1624

5-14

0

10

20

30

40

50

60

70

80

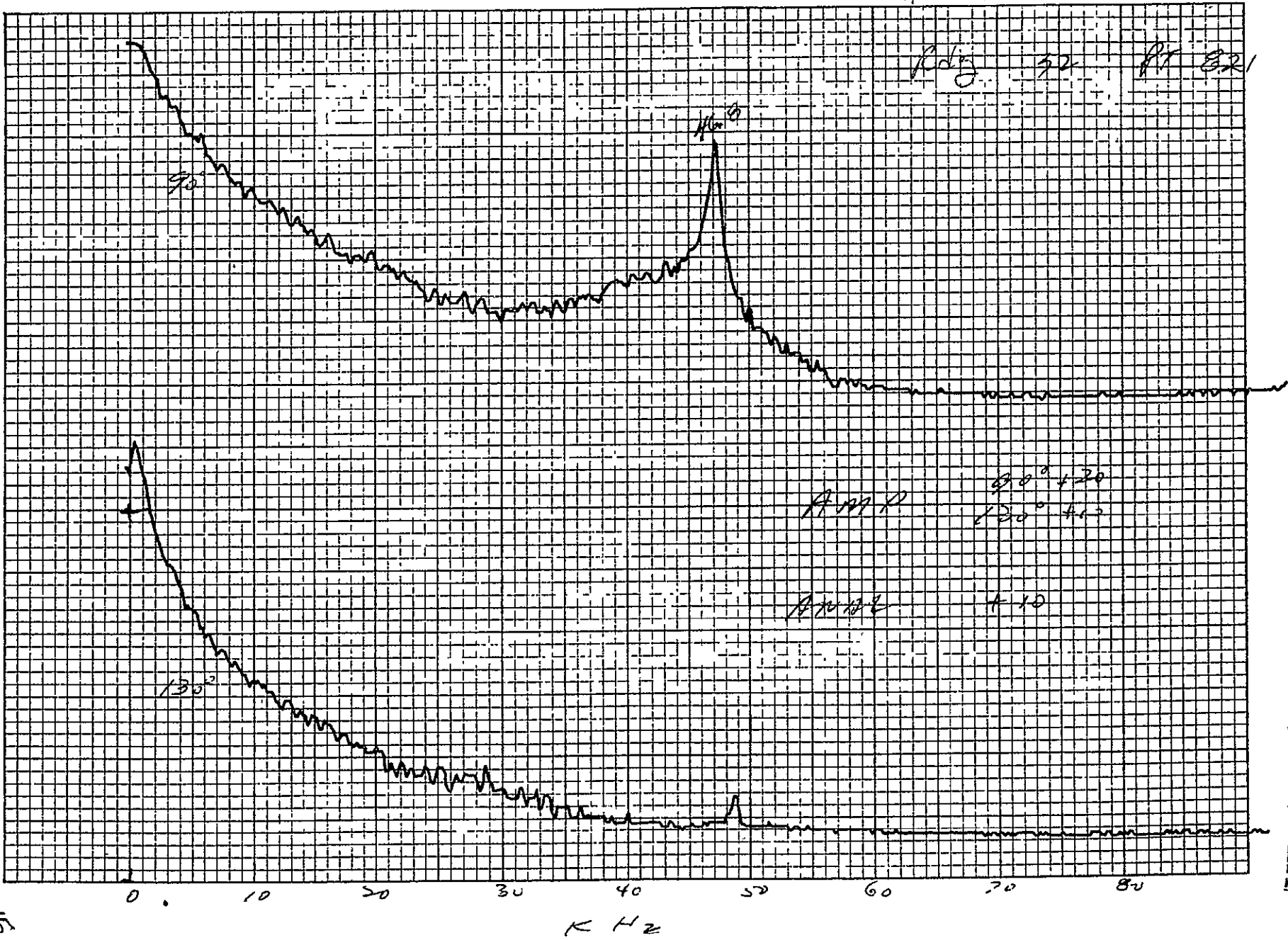
KHz

4-7-75

Rdy 32 RT 821

1625

5-15

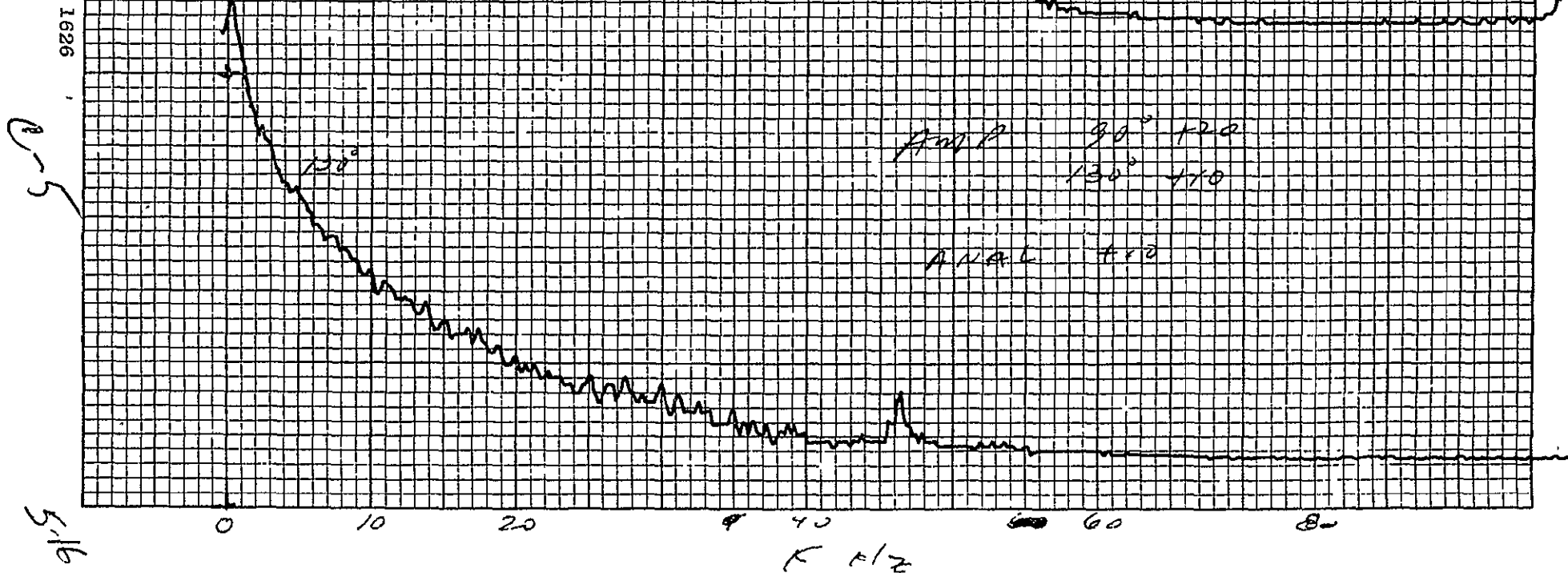


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4-7-75

Log 33

PT 821



4 APR 1975

ROG 8 PT 823

30°

AMPL

ANAL

20 db
130 db
10 db
0 db
+20 db

5 KHz

30°

7.0 KHz

KHz

1627

5.17

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4 Apr 1975

R068 Pt 823

1628

5-18

0

1

2

3

4

5

6

7

8

9

KHz

90°

5.1 KHz

4.8 KHz

9.0 KHz

2.34 KHz

4 APR 1975

ROG 12 Pt 825

130°

AMPL 90° +10
130° 0

ANAL +10

90°

1629

5-9

KHz

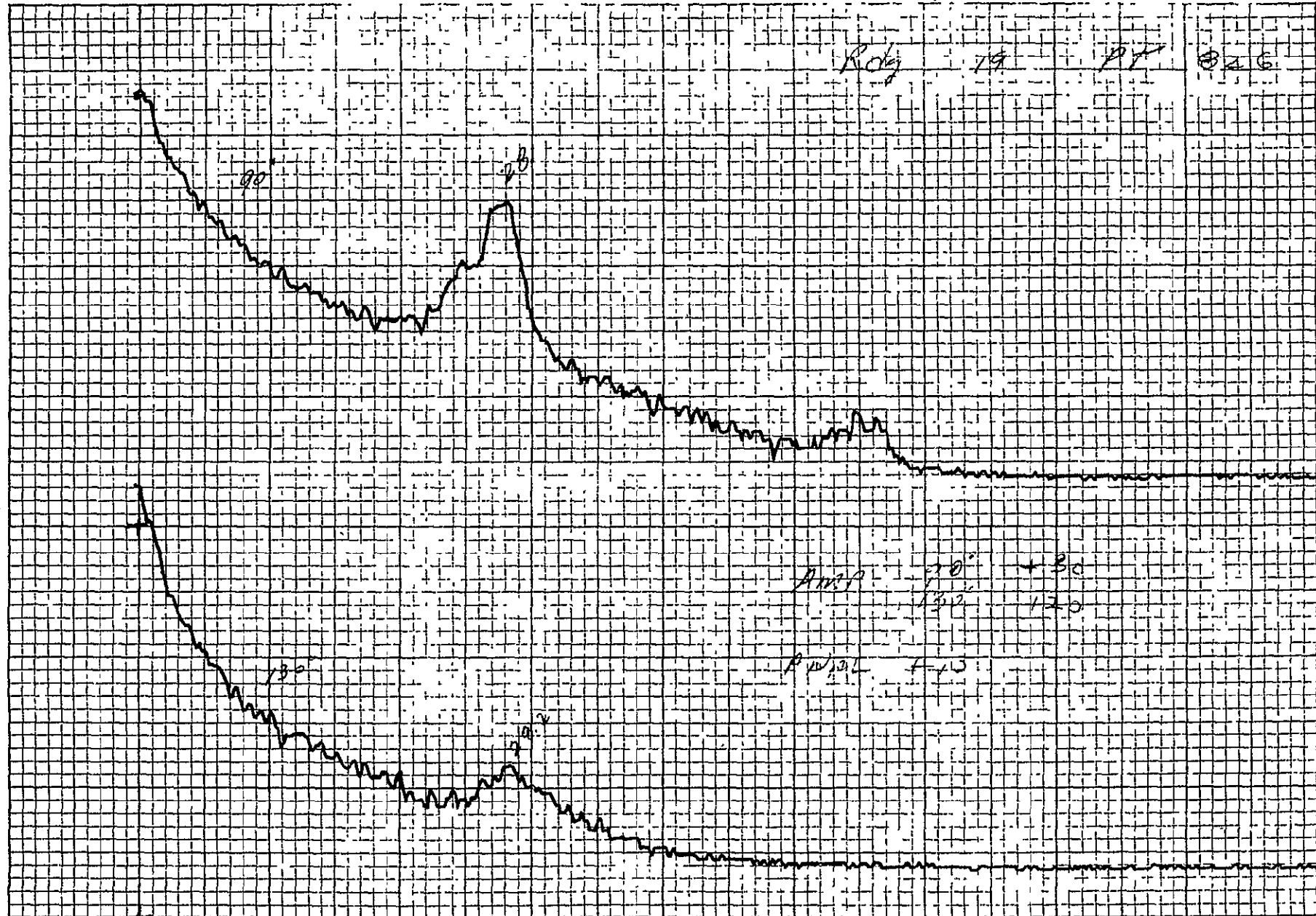
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4-7-75

Ref 19 PT 826

1630

5.20



AMP 70° + 30
130° 120
P.W. 10

4-7-75

100 2.2 15 82.7

90°

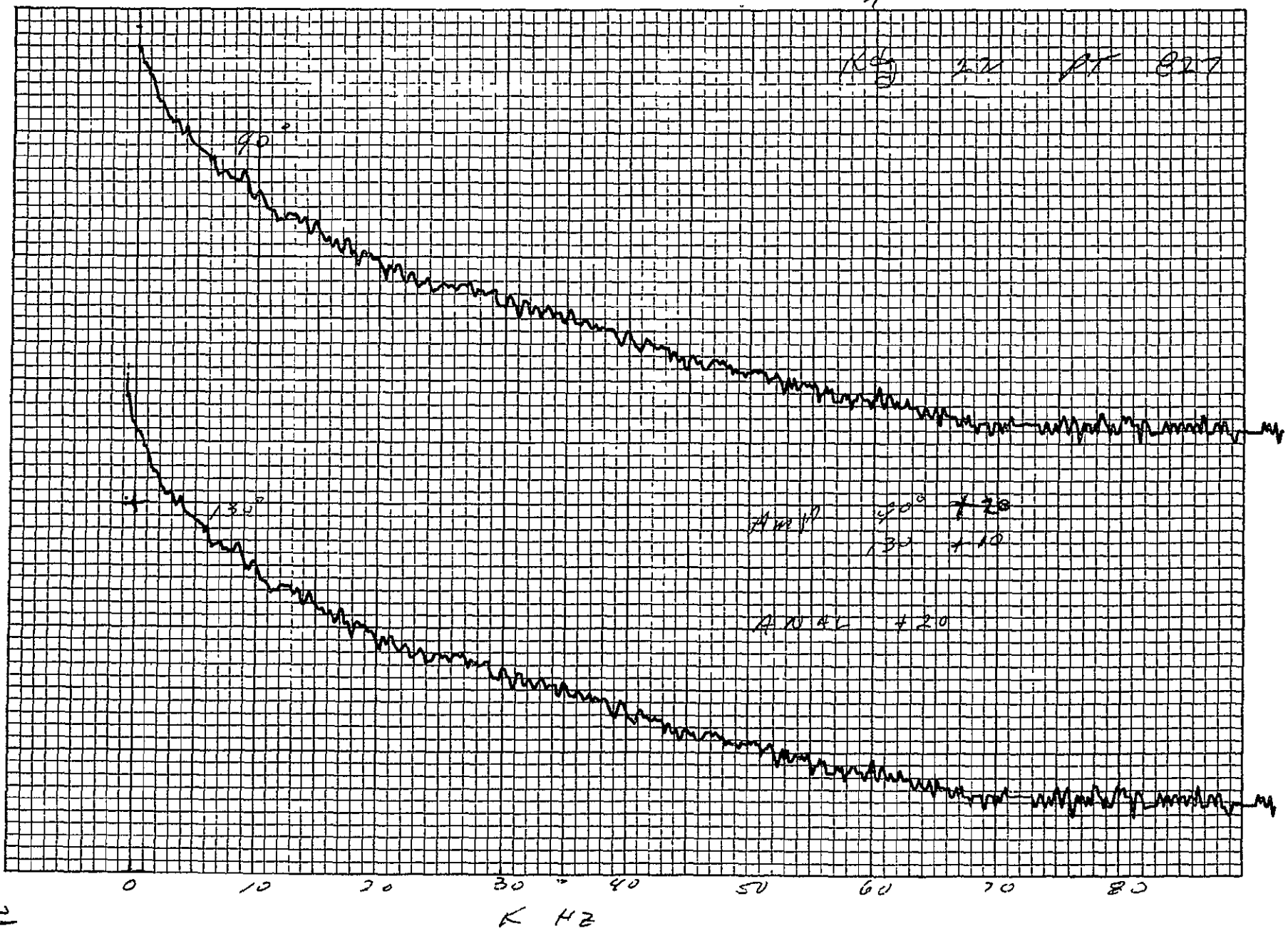
130°

40° + 20
130 + 10

40° + 20

1631

5.21

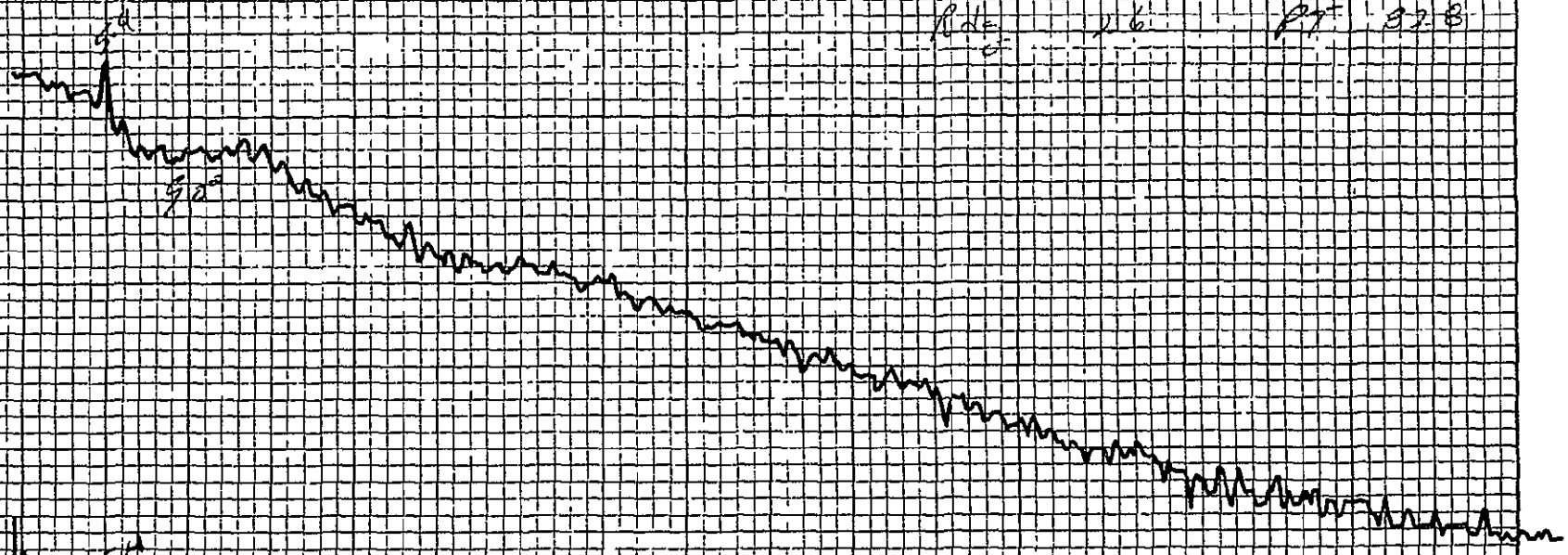


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H-7-75

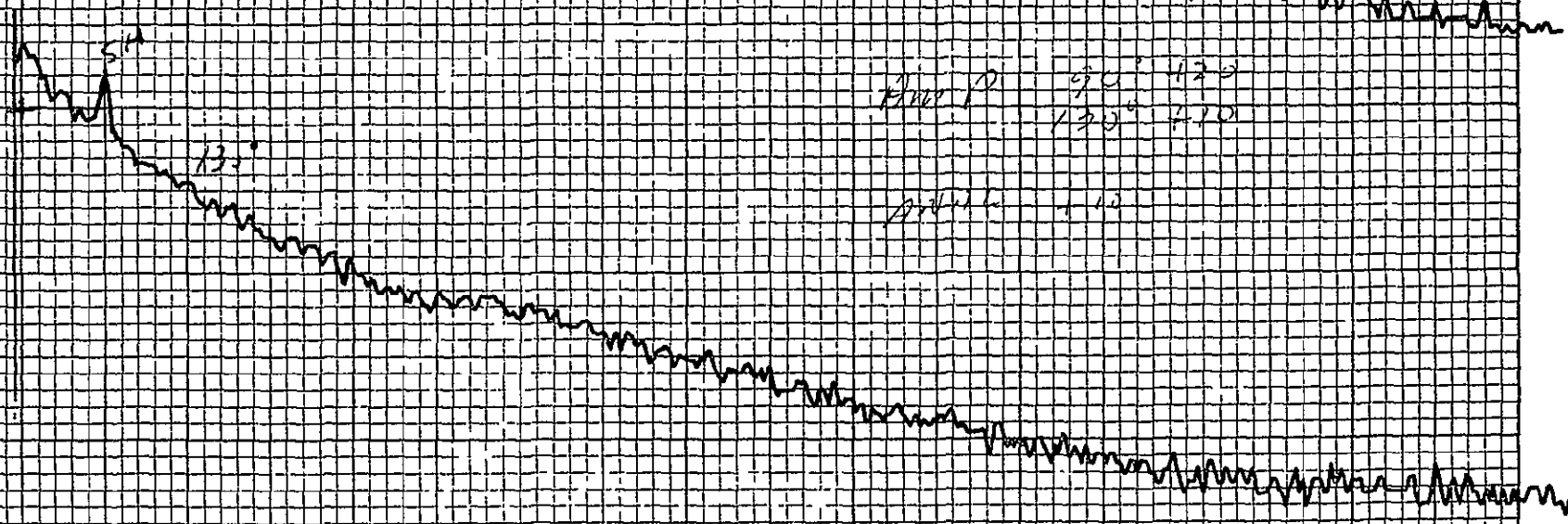
Ref 26

PT 82.8



Ref 10 9.0 12.0
13.0 14.0

Ref 10



1632

5.22

K 12

4-7-75

Rdg

25

PT

~~8.25~~

1633

130°

A.M.P

90°

120

130°

140

P.M.P.L

110

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K HZ

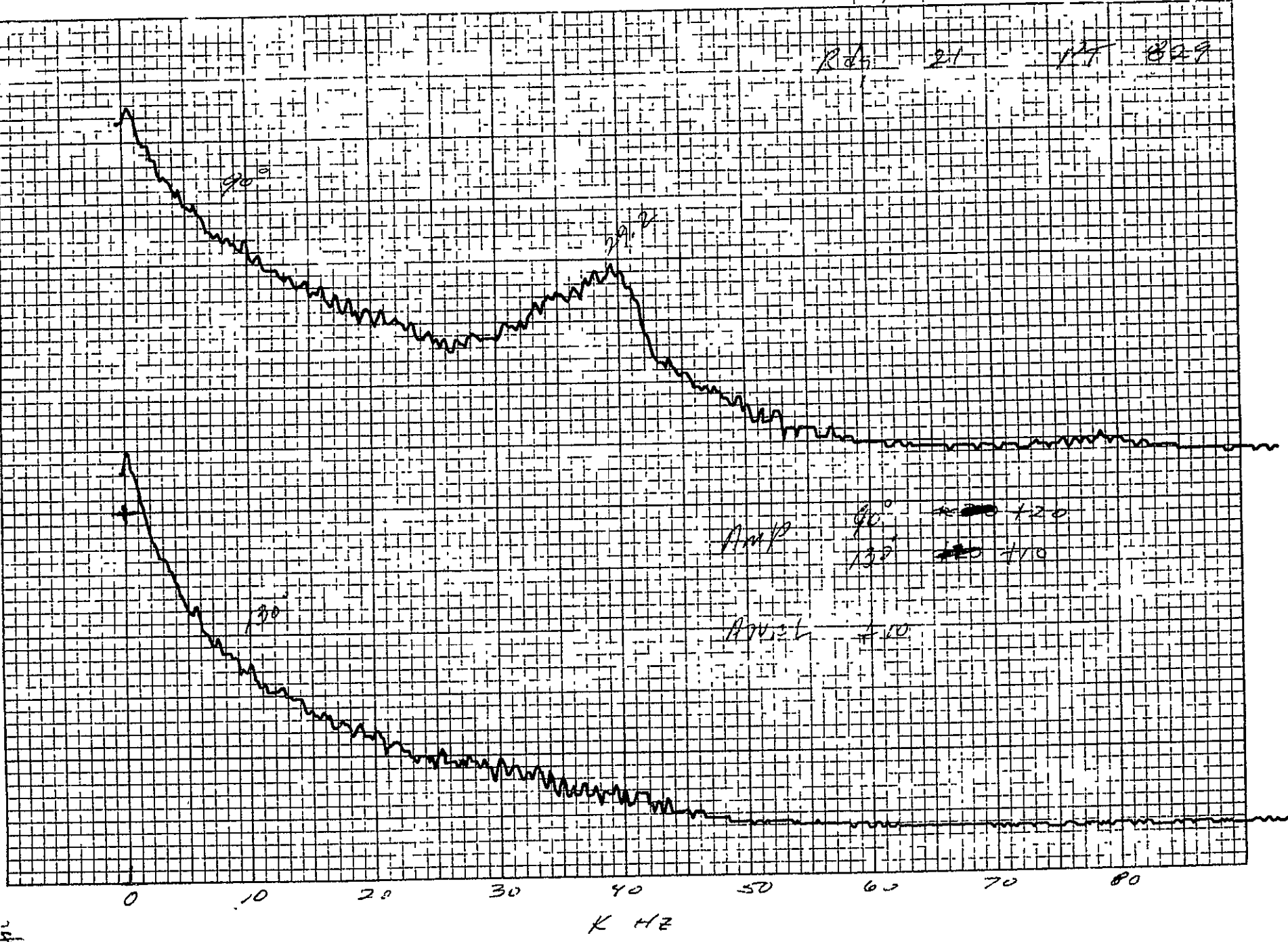
5-23

4-7-75

Rd 21 117 829

1634

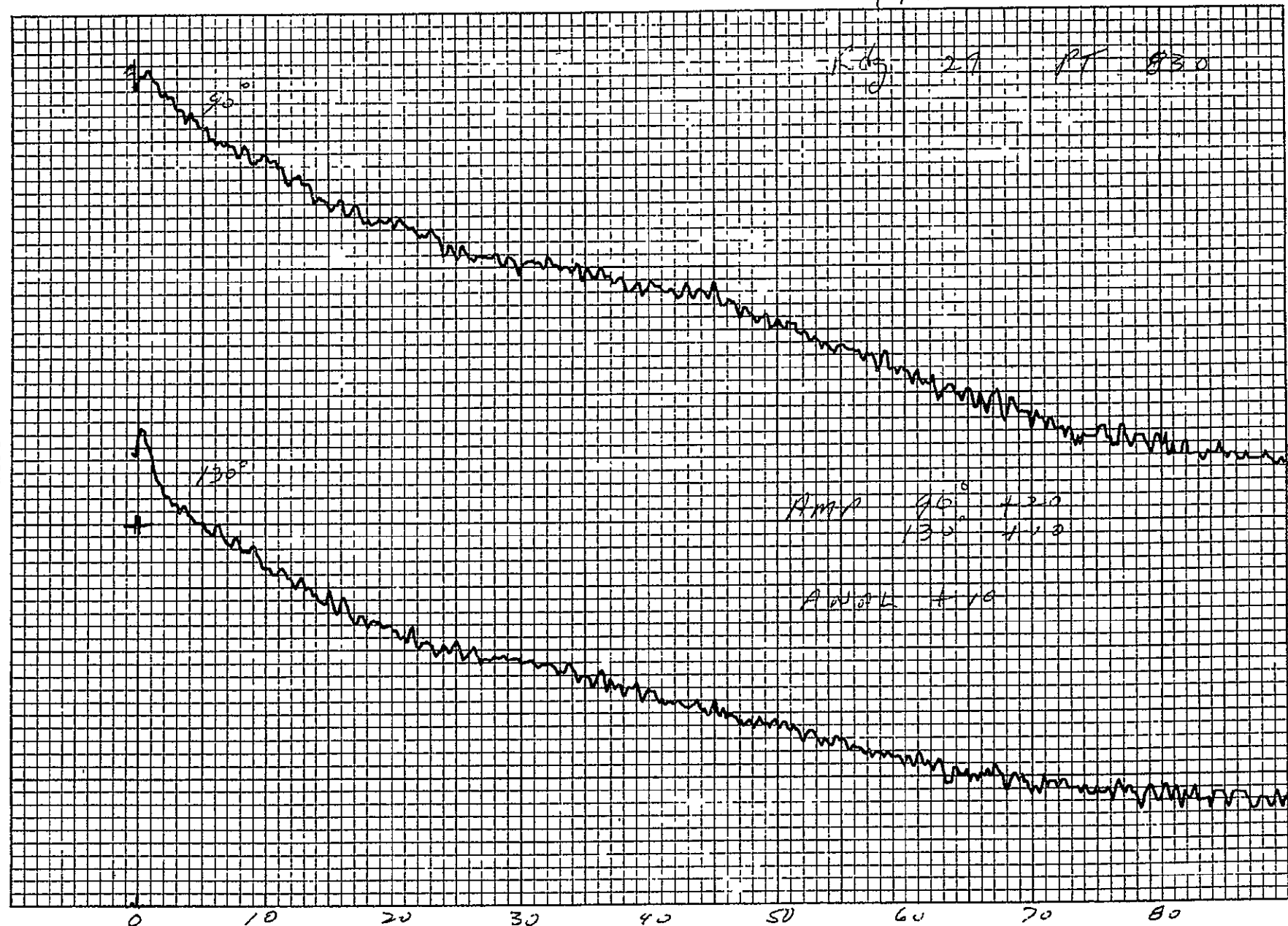
5.24



4-7-75

-Kdy- 2.7 PT 83.0

1635



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5.25

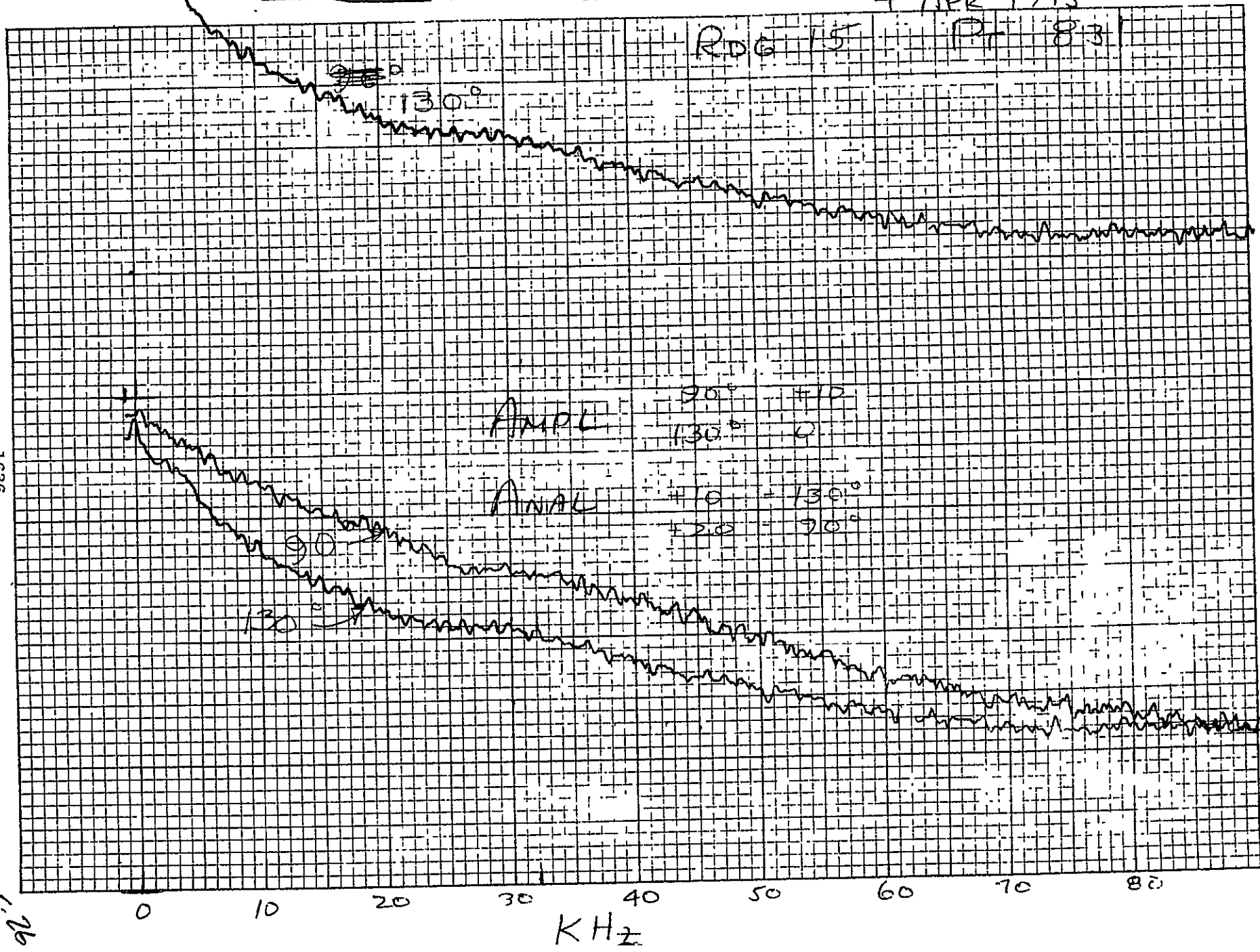
~~Rev~~
~~PROB 15~~

4 APR 1975

ROC 15 Pt 83

1636

6-9
96



AMPL 90° #12
130° 0

ANAL #10 = 130°
#20 = 90°

4-7-75

Rdg 10 PT 836

90

AMP 90 420
130 410

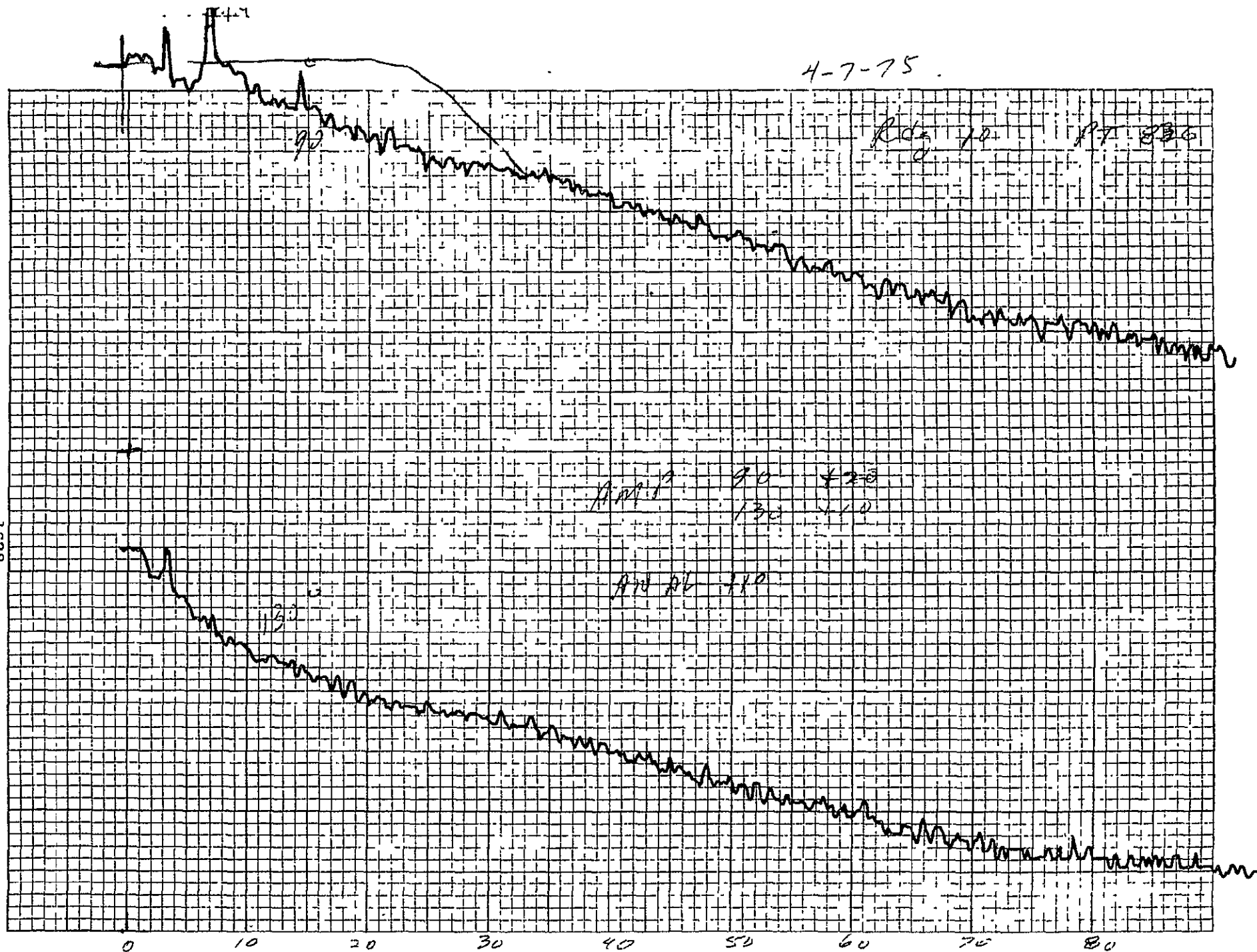
AMP 110

110

1638

528

K 4/2



4-7-75

PT 30

PT 837

92°

130°

PT 10 120
130 0

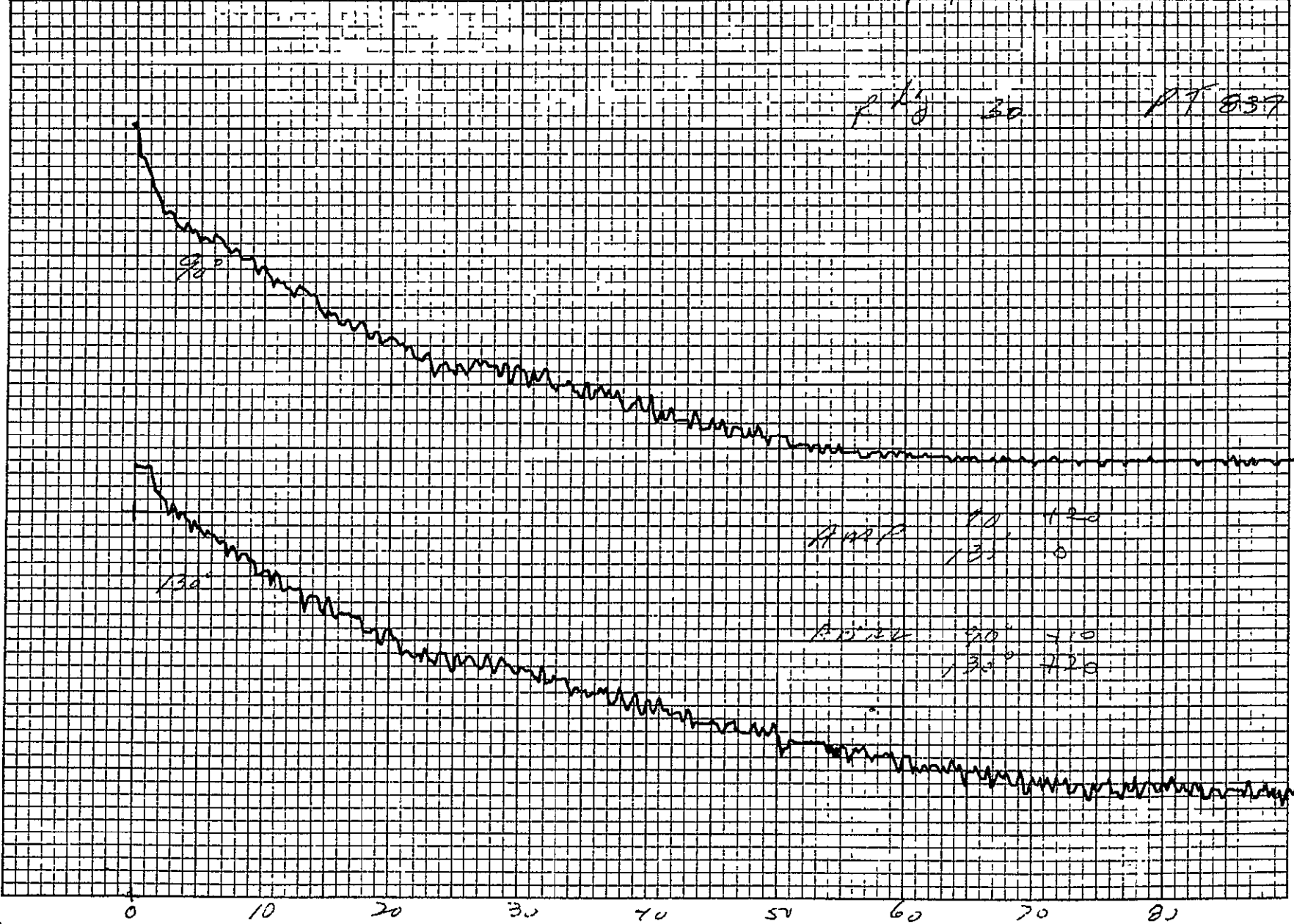
PT 20 410
130 420

K 112

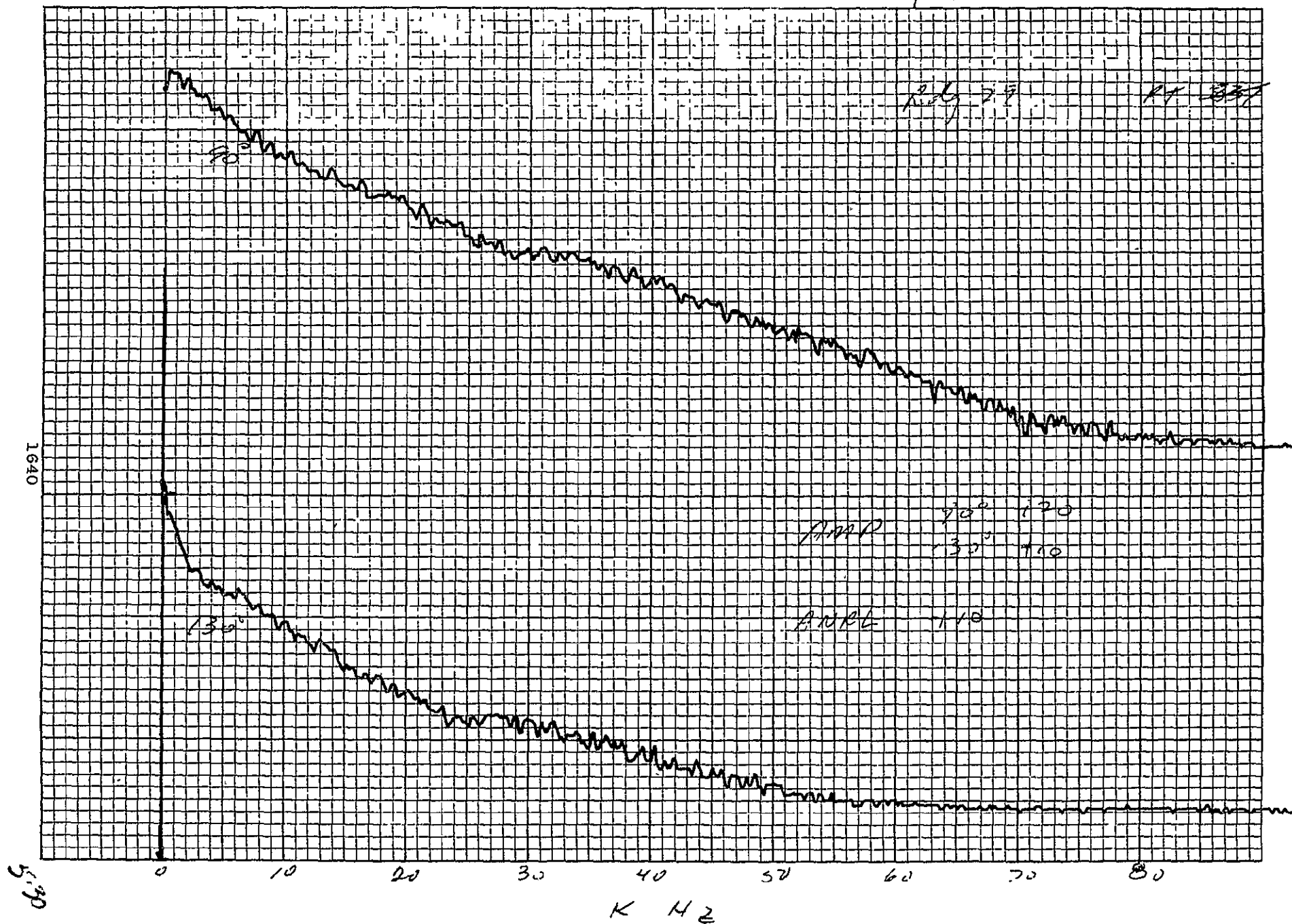
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1639

529



4-7-75

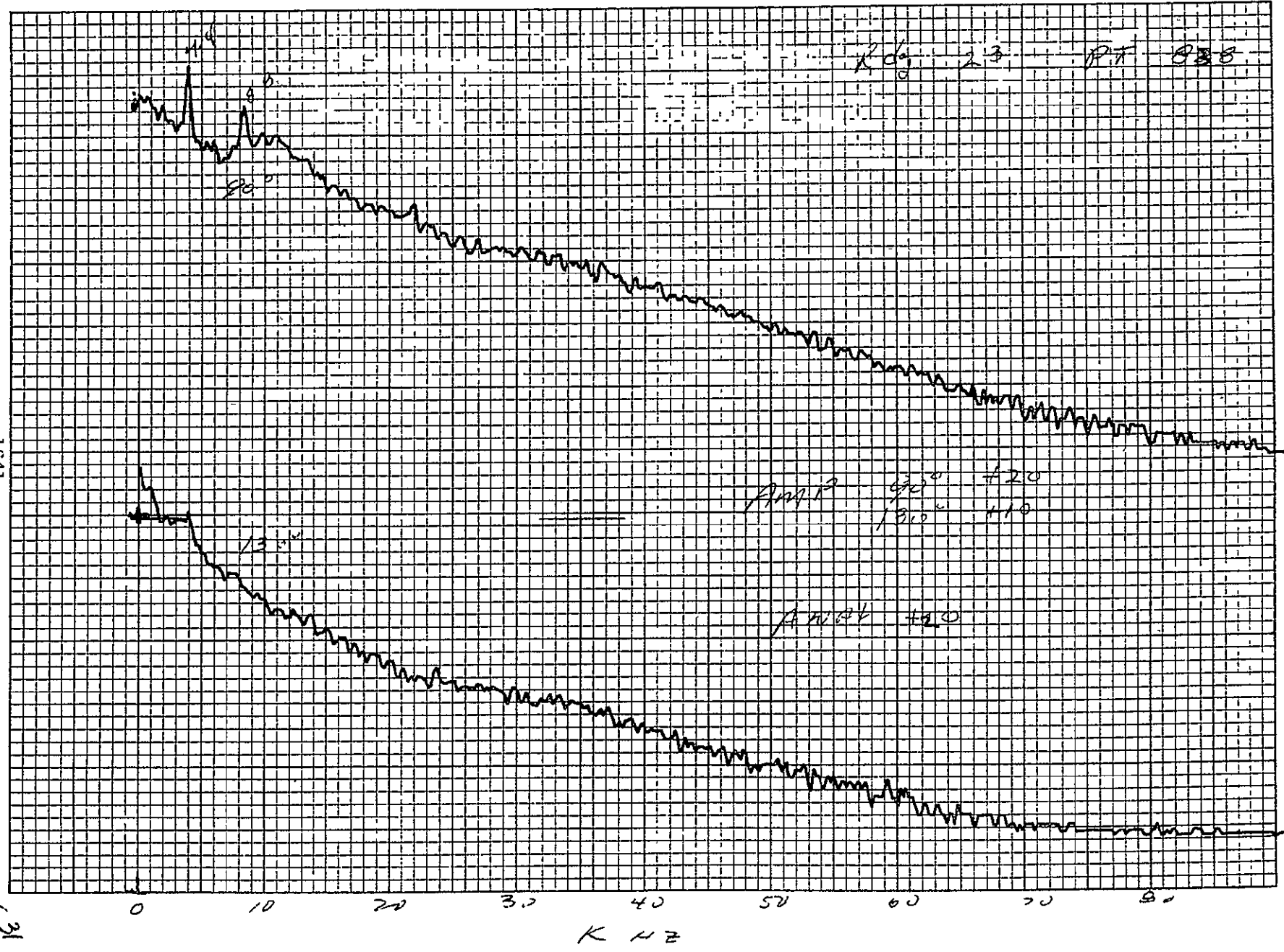


4-7-75

Kdg 23 RT 888

1641

531



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4 Apr 1975

ROC 17

Pf 839

90°

AMPL

90° ±10

130° 0

ANAL

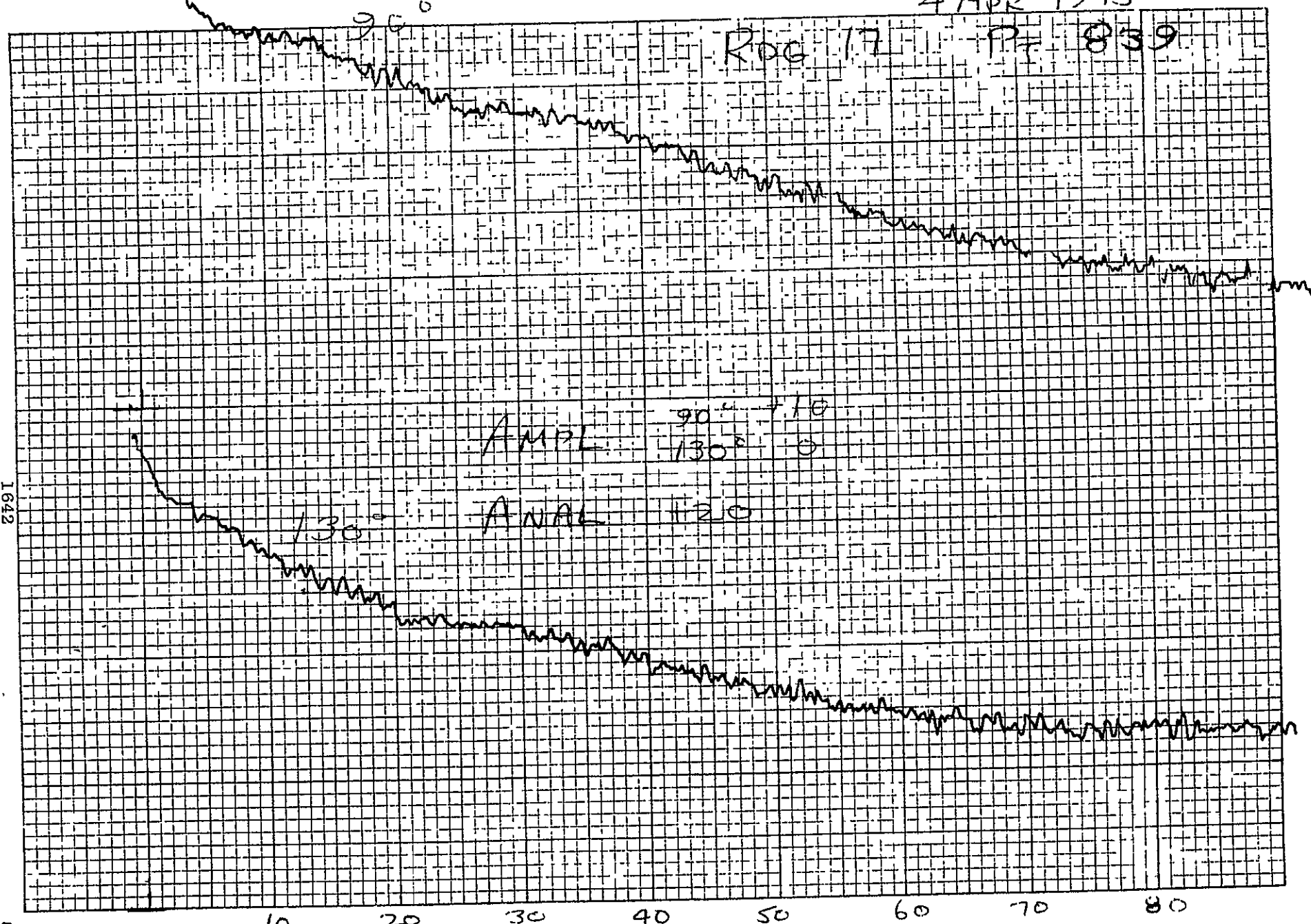
H₂O

130°

KHz

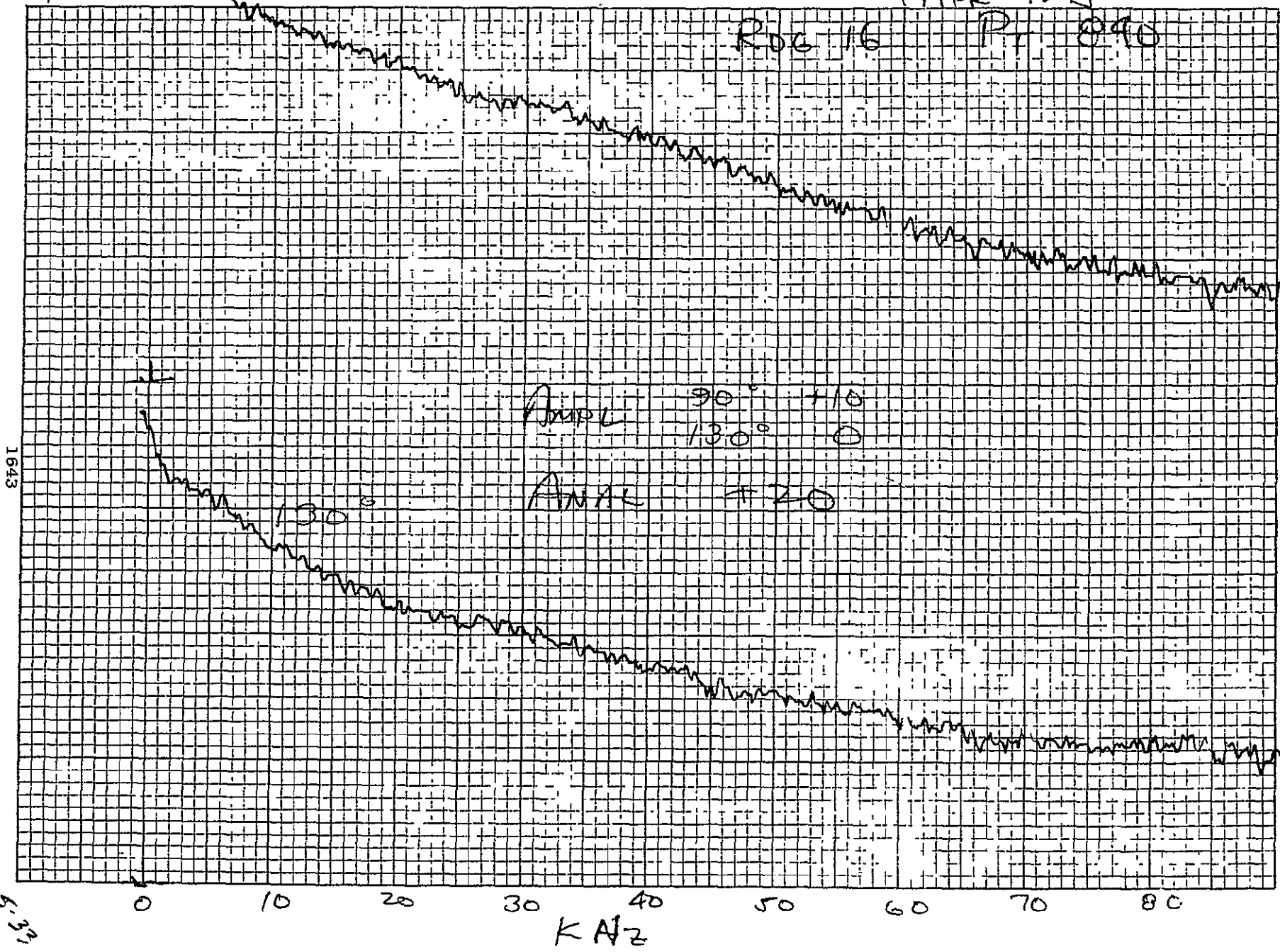
1642

132



4 APR 1975

ROC 16 P. 890



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4 Apr 1975

RDG 14 PF 84

90°

AMPL

90° +10

130° +0

AMPL

+10

90°

130°

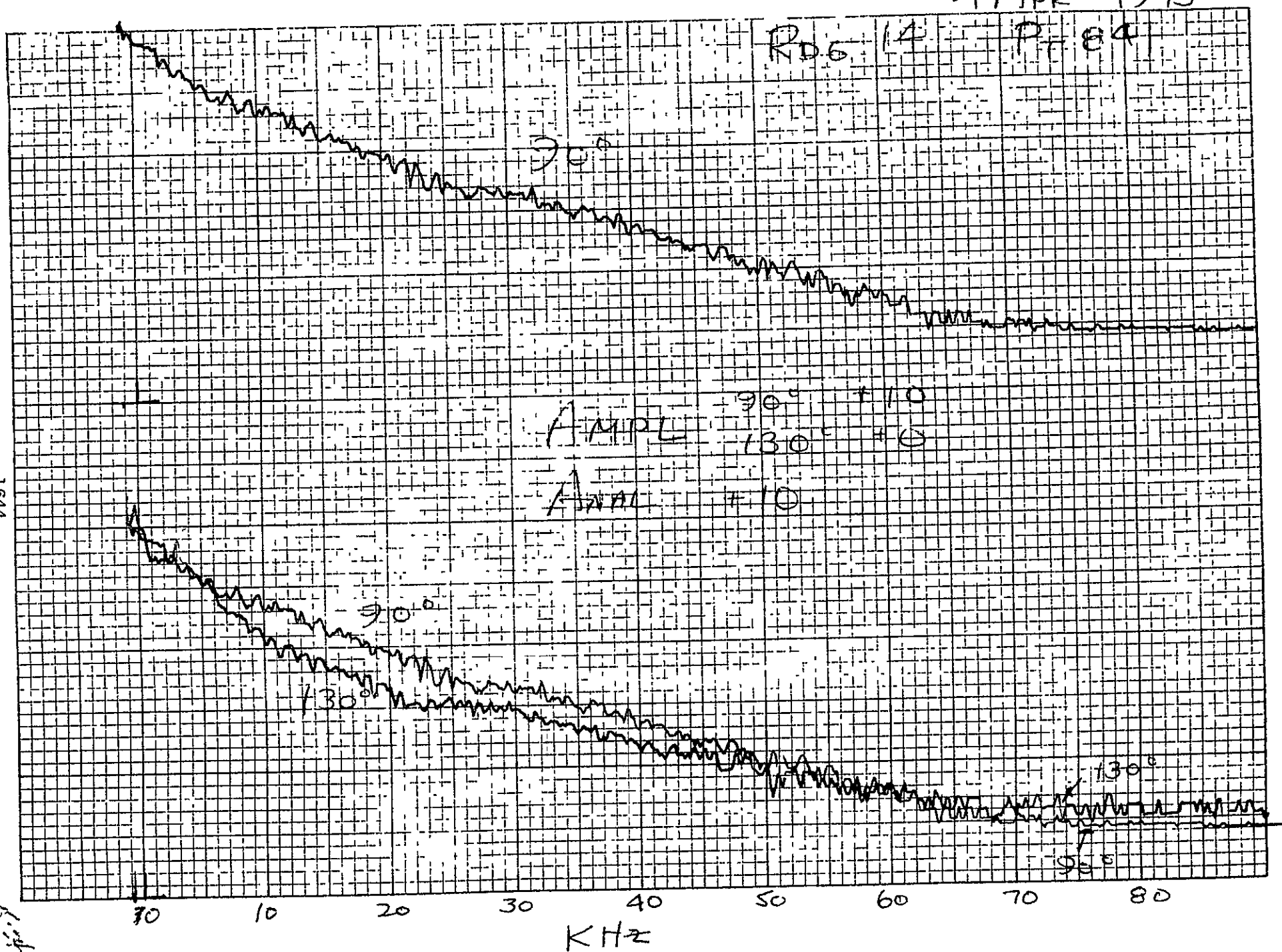
130°

90°

KHz

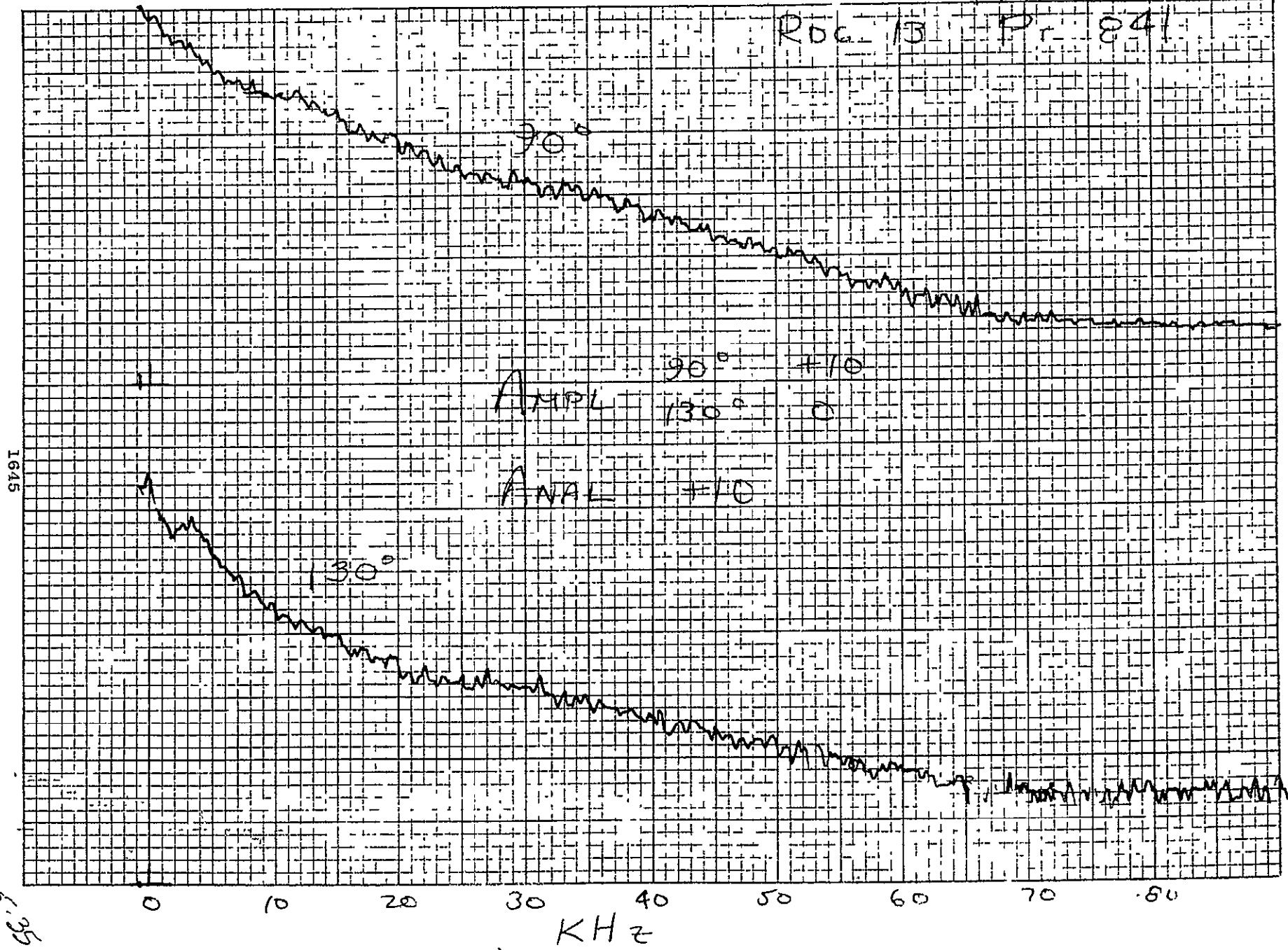
1644

5.4



4 APR 1975

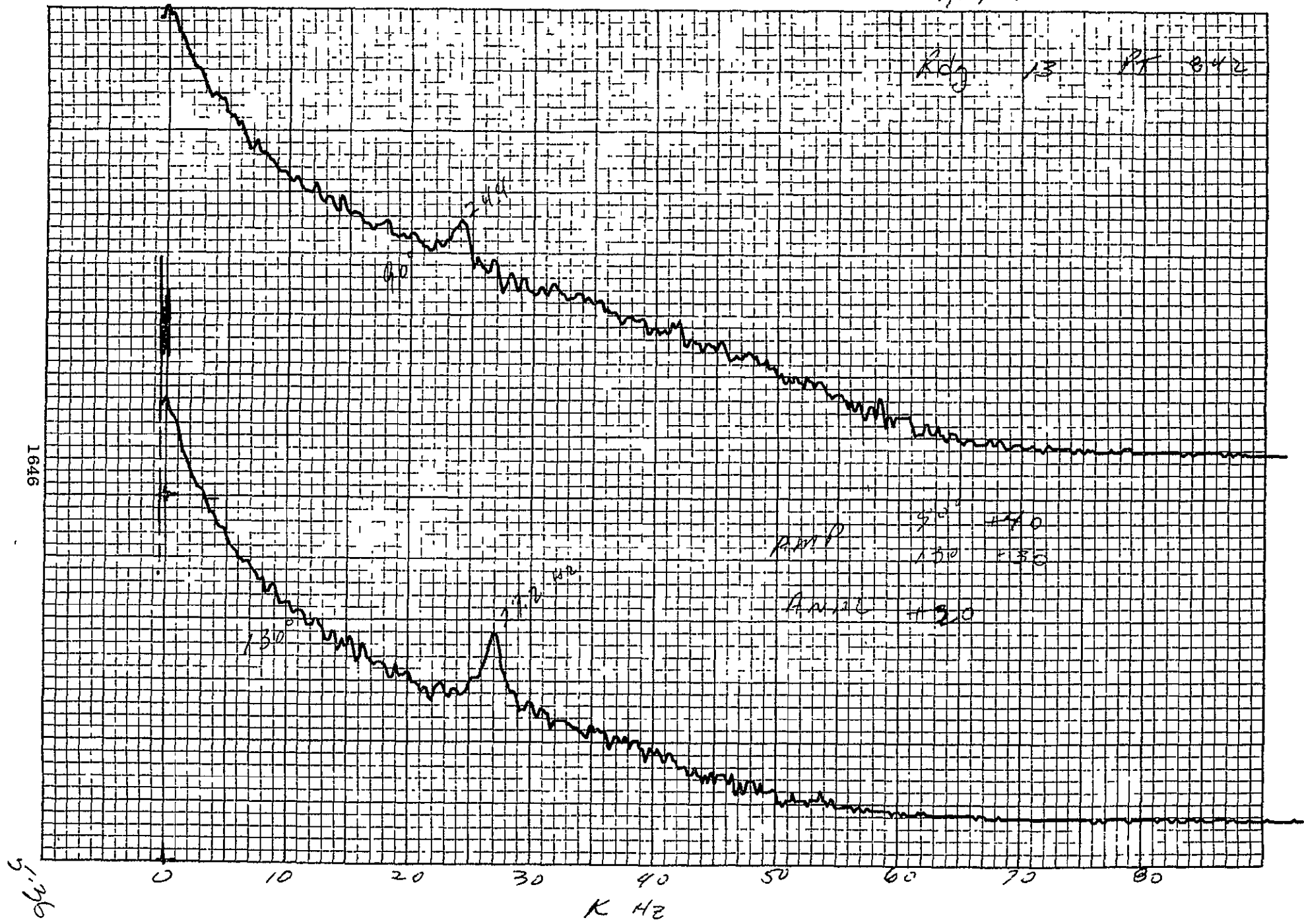
ROC-13 Pr 841



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4-7-75

Kd3 13 RT 842



4-7-75

Ref 6

Pl 843

80

23.12

AMPL

80

+30

130

+30

AMPL

100

130

KHz

1647

5.97

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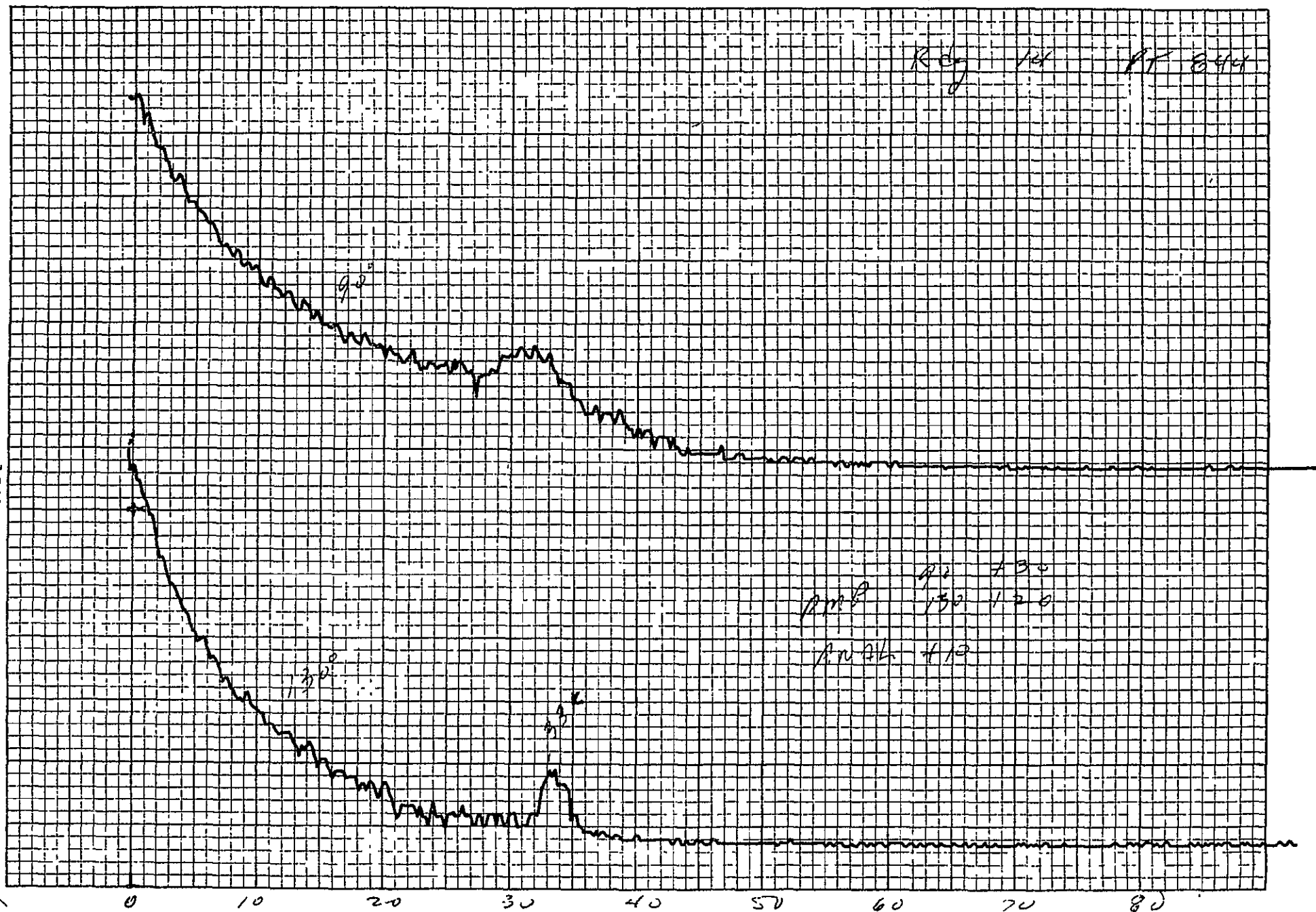
4-7-75

Reg 14 RT 844

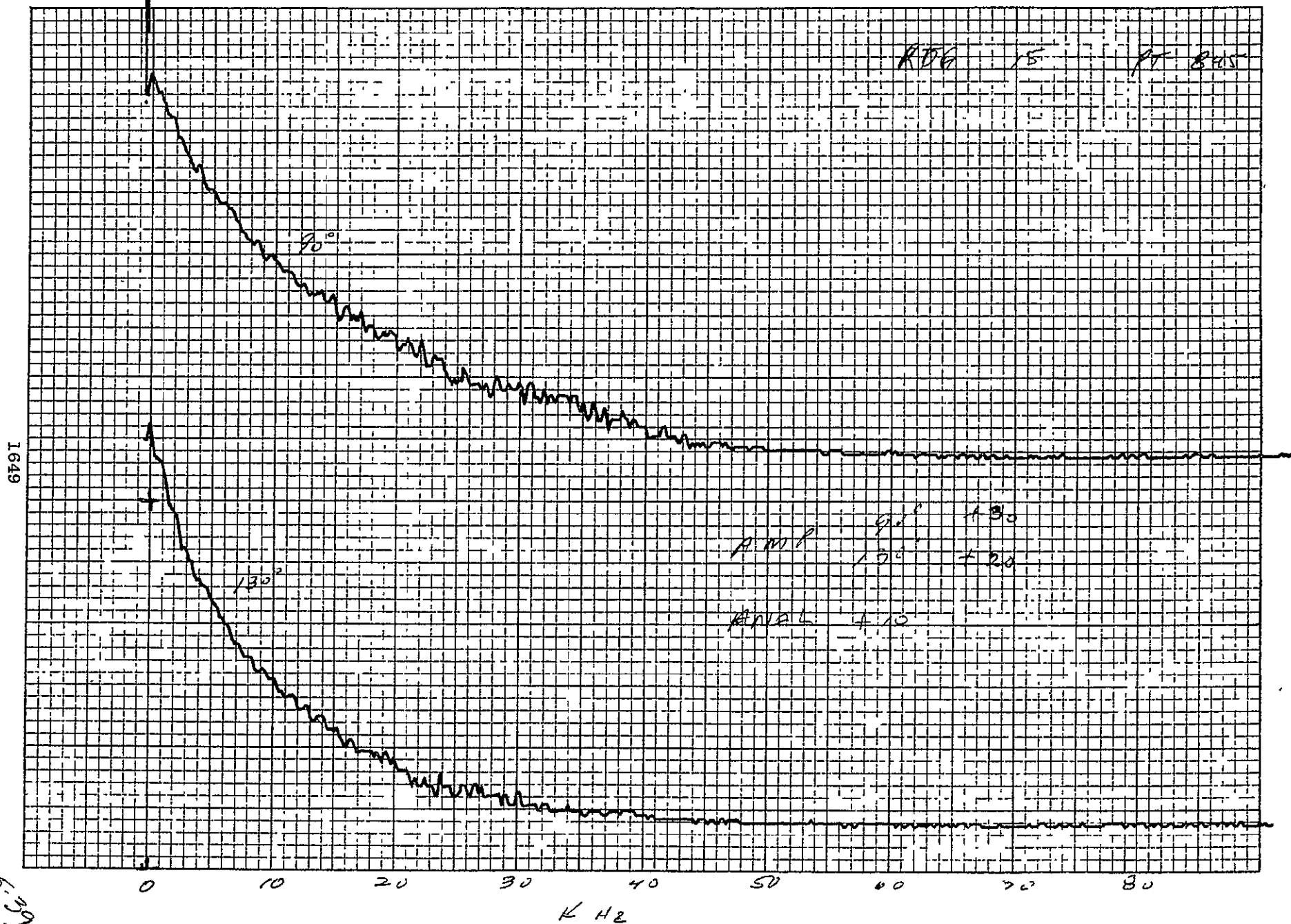
1648

AMB 90 130
130 120
ANAL 412

5-78



4-7-75



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6-09

4-7-75

Rdy 17 17 896

1650

540

00

10

20

30

40

50

60

70

80

K 4.2

50°

20°

13°

20°

AMP

40 + 30
130 + 20

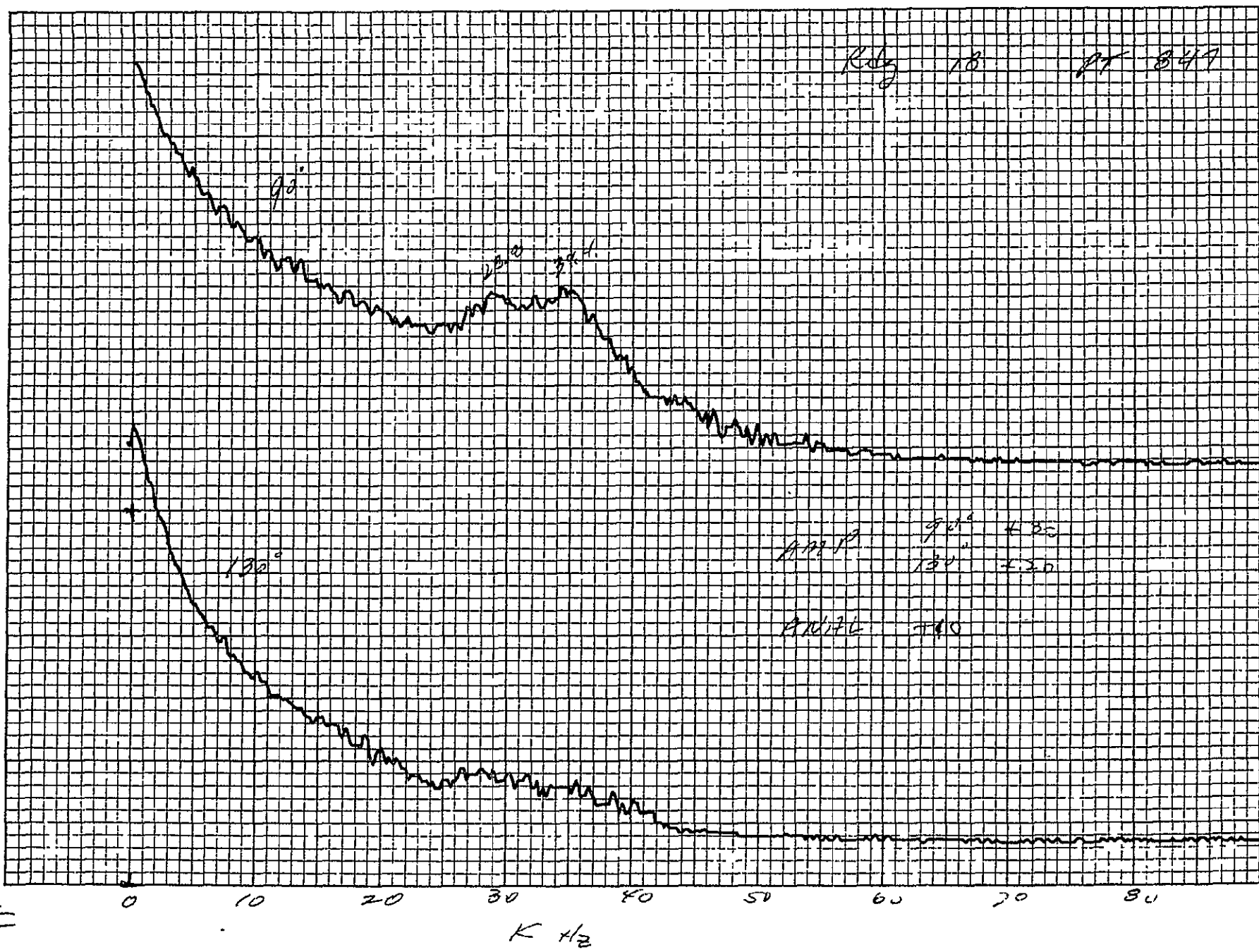
ANAL

4-7-75

Rdy 18 RT 847

1651

5-411



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4-7-75

Rdg 57 840
58

8.0°

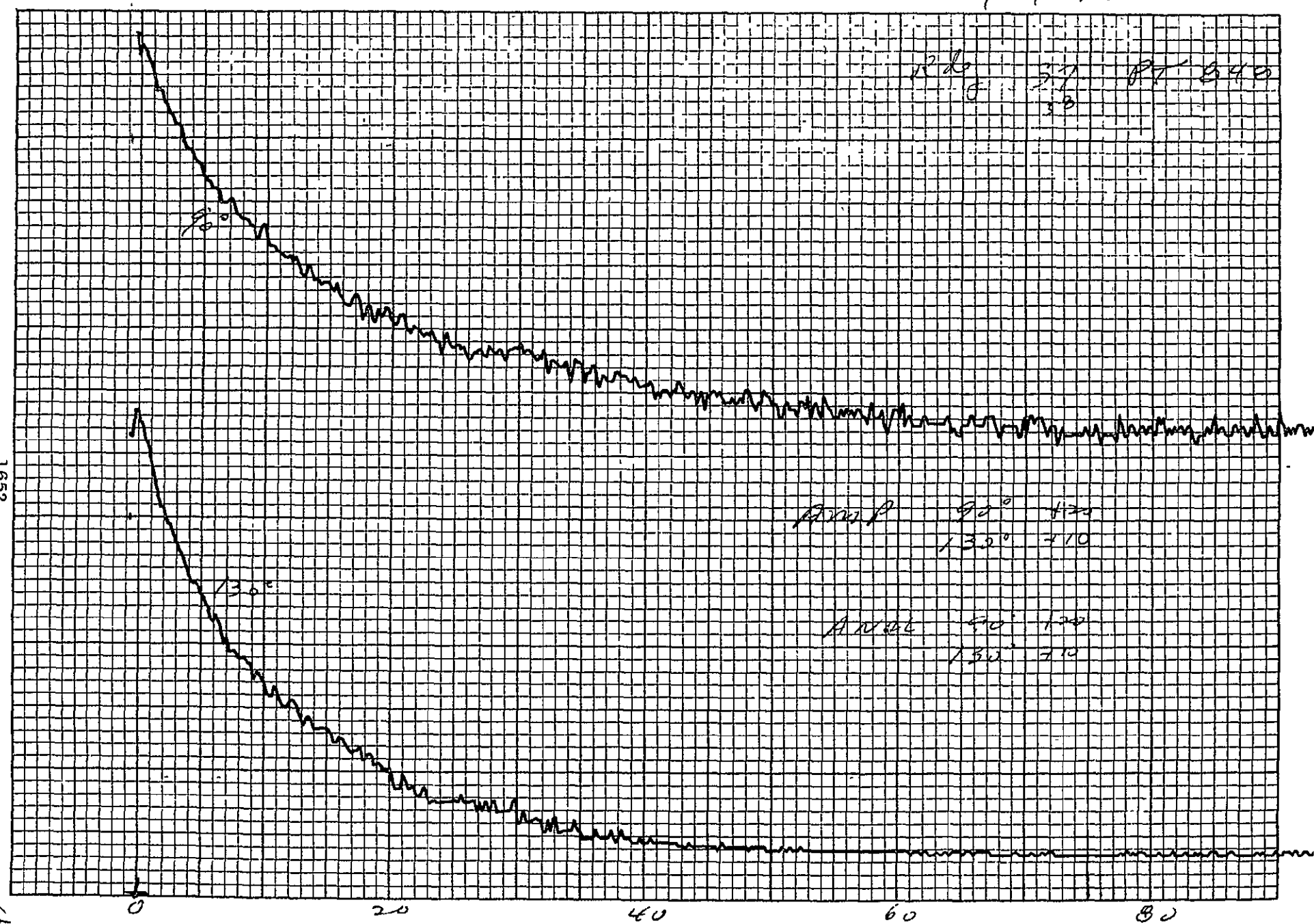
AMP 92° 420
132° 710

ANAL 90° 120
130° 710

13.0°

1652

542



4-7-75

Rdg. 37 RT 30.8

90°

130°

AMP 90° 120
130° 110

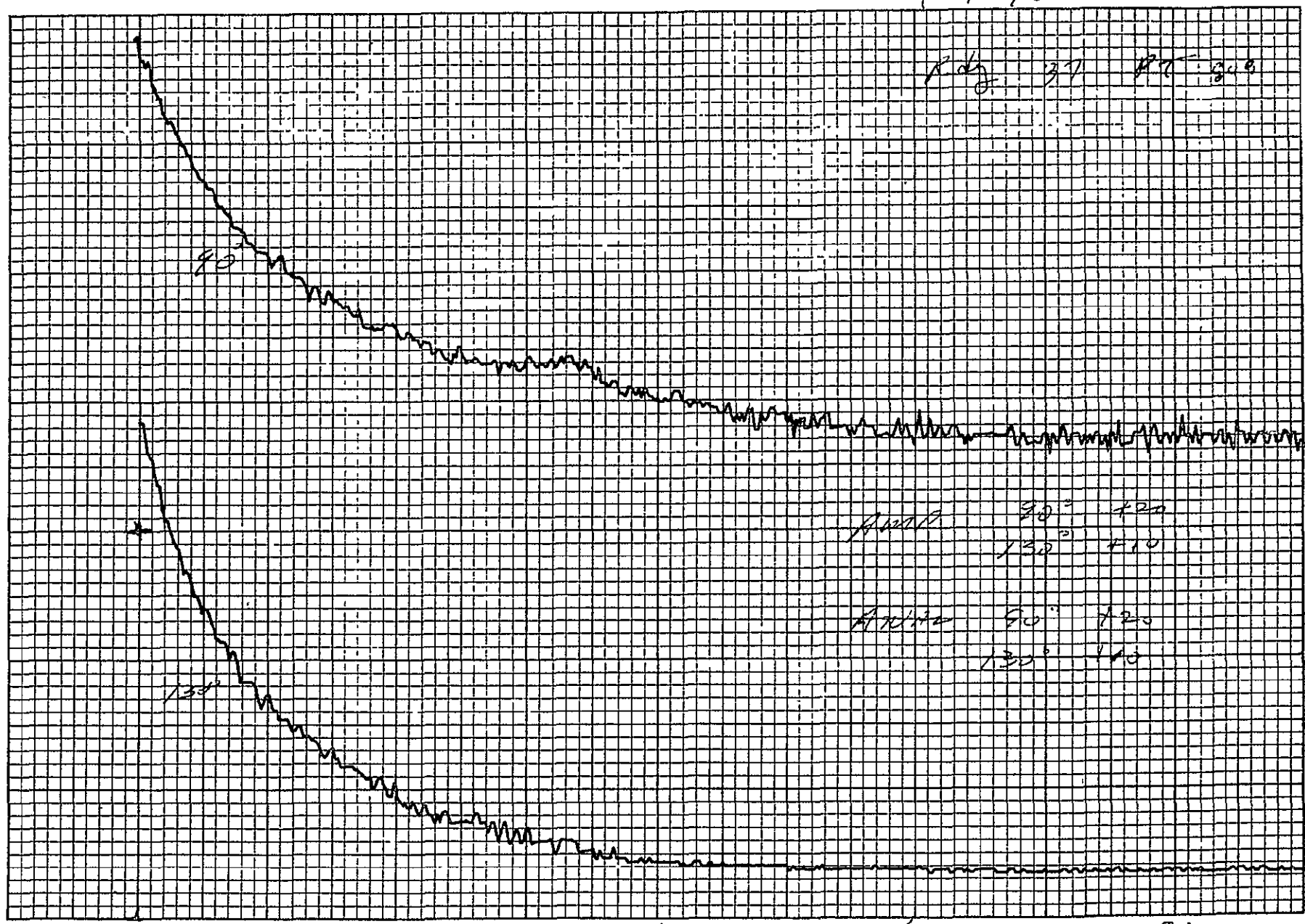
AMP 90° 120
130° 110

K Hz

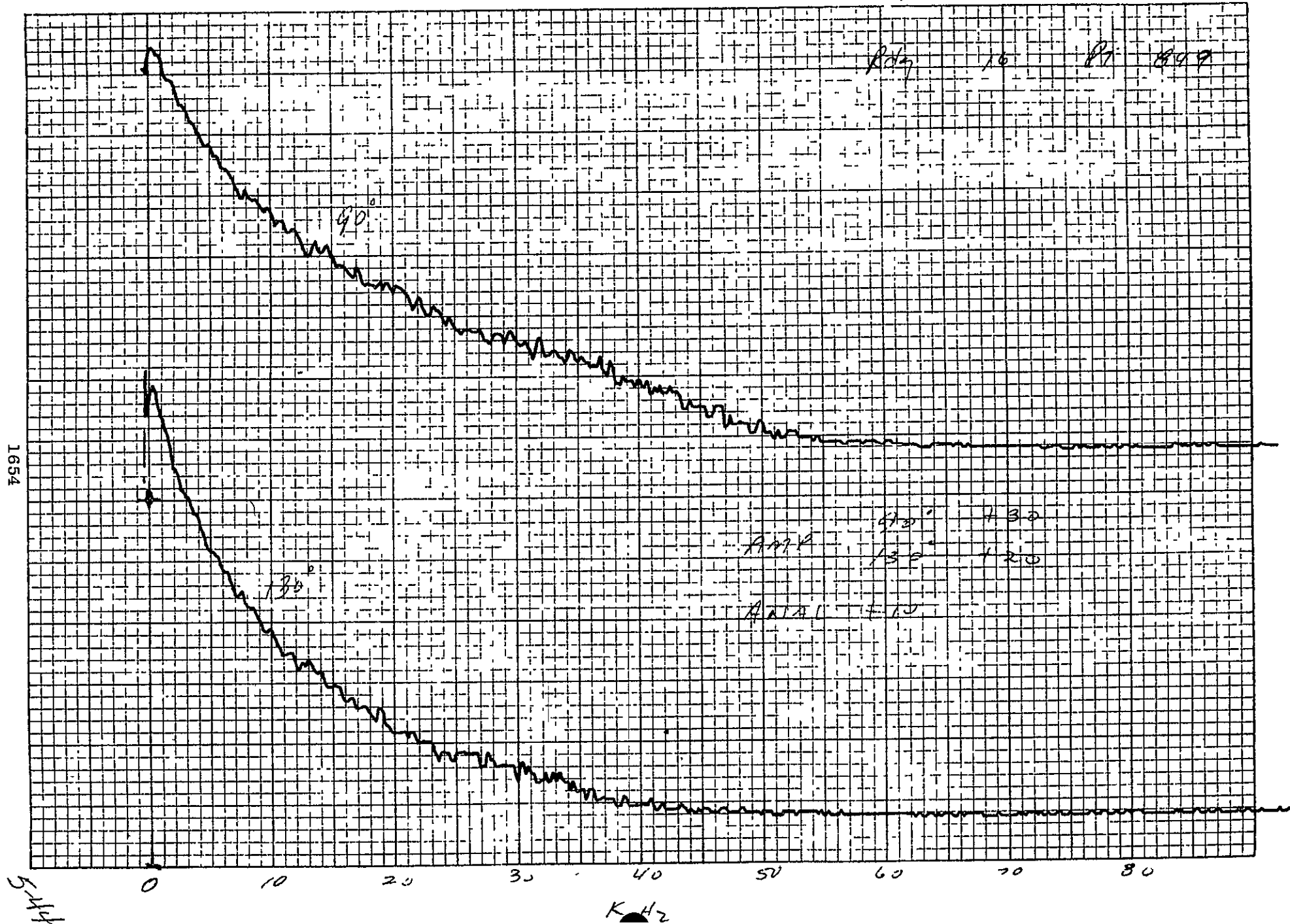
ORIGINAL PAGE IS
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1653

6-4-3

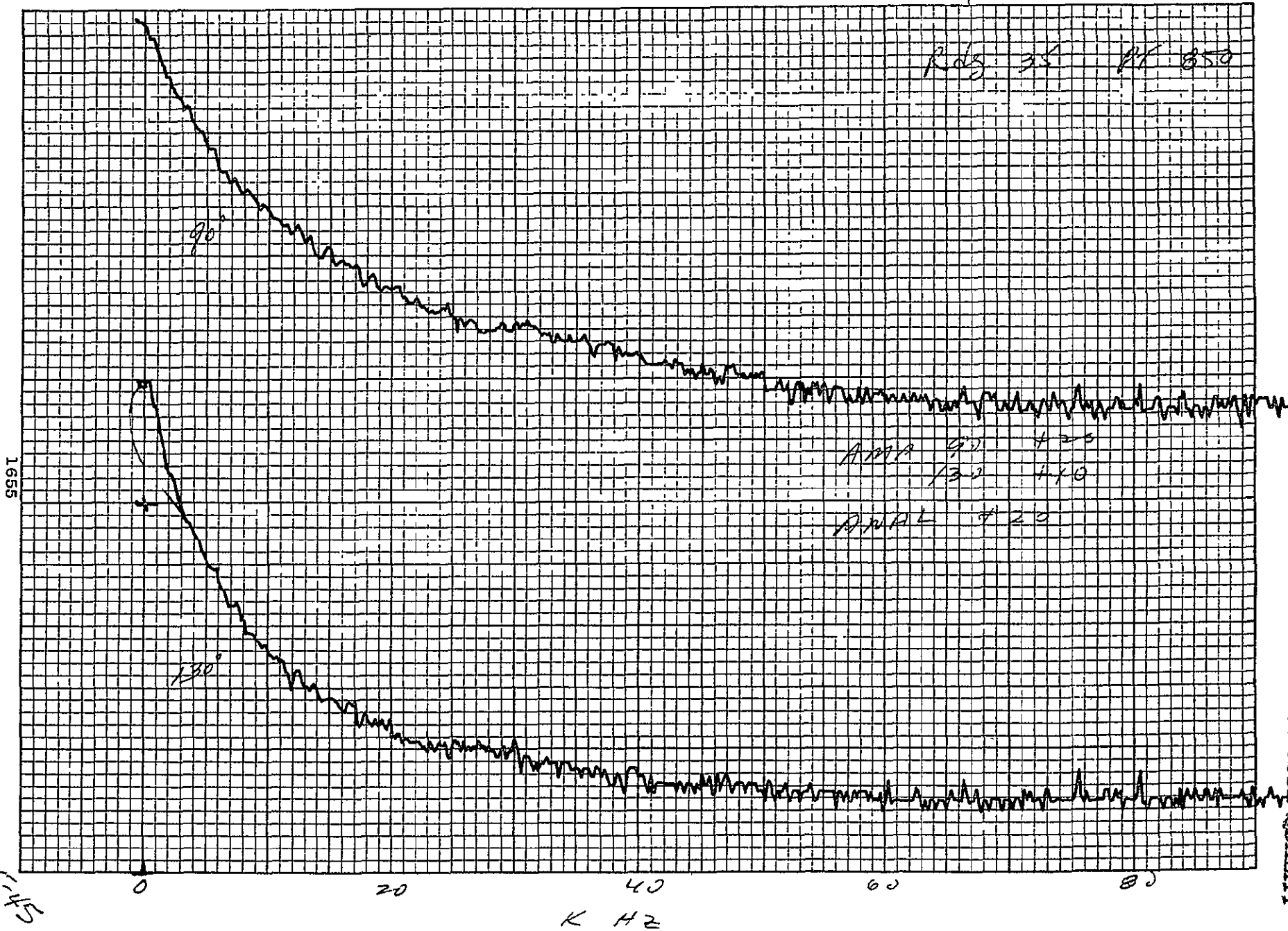


4-7-75



4-7-75

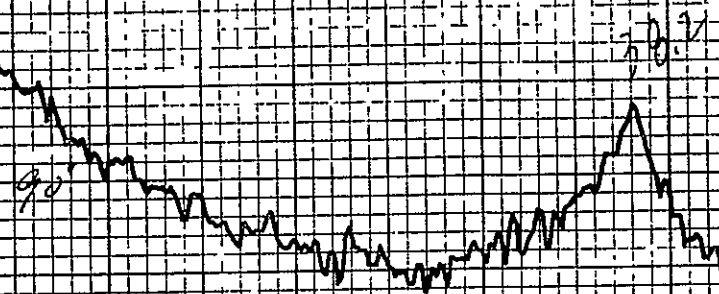
Rds 35 RT 850



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4-7-75

Adg 34 PR 851



1656

ARR 90° +20
130° +10

~~ARR~~ +10

130°

5-46

K Hz

4 Apr 1975

Rdg 11

Pt 852

130°

20° = 10

130° = 0

AMPL

ANAL

+10

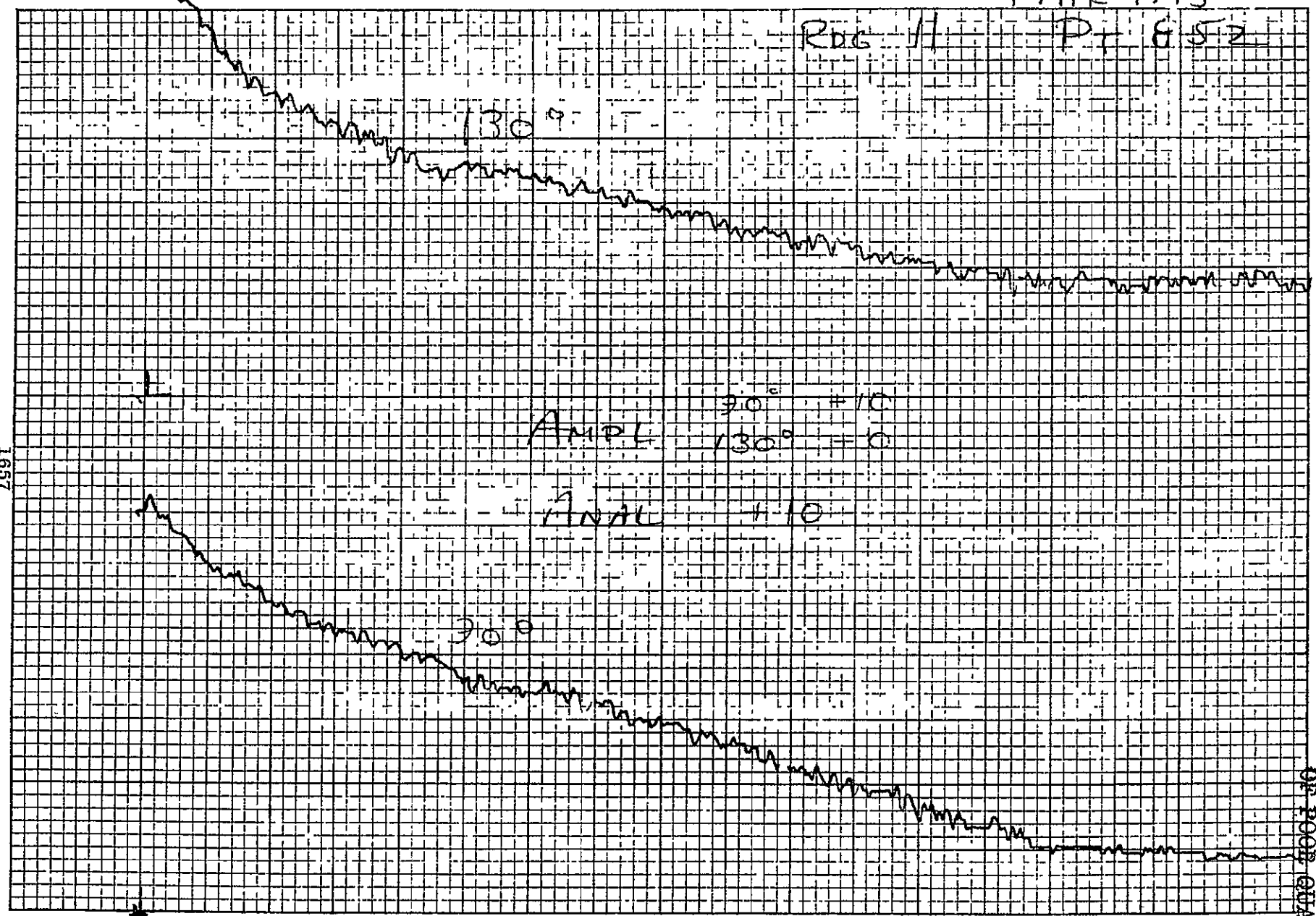
30°

KHz

ORIGINAL PAGE IS
OF POOR QUALITY

1657

549



4 APR 1975

ROC 5

Pt 853

90°

53.8 KHz

130°

90°

+20 db

AMPL

130°

+10 db

ANAL

+10

130°

1658

5-M

0

10

20

30

40

50

60

70

80

KHz

4 APR 1975

RDG 2

PT 854

90°

AMPL 90° ± 20°
ANAL 130° ± 10°
ANAL ± 10°

130°

1659

5-19

ORIGINAL PAGE IS
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4 APR 1975

ROG 10 PR 8.55

130°

AMPL

20°

10 db

130°

0 db

ANAL

+10

OTTER

COLEMAN

90°

KHz

1660

650

4 Apr 1975

Rdg 6 P. 856

1661

AMPL 30° ± 10° ± 10 db
130° ± 10° ± 0 db
ANAL +10 db

90°

K Hz

ORIGINAL PAGE IS
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4 Apr 1975

Rdg 3

Pt 257

34.6 KHz

90°

130°

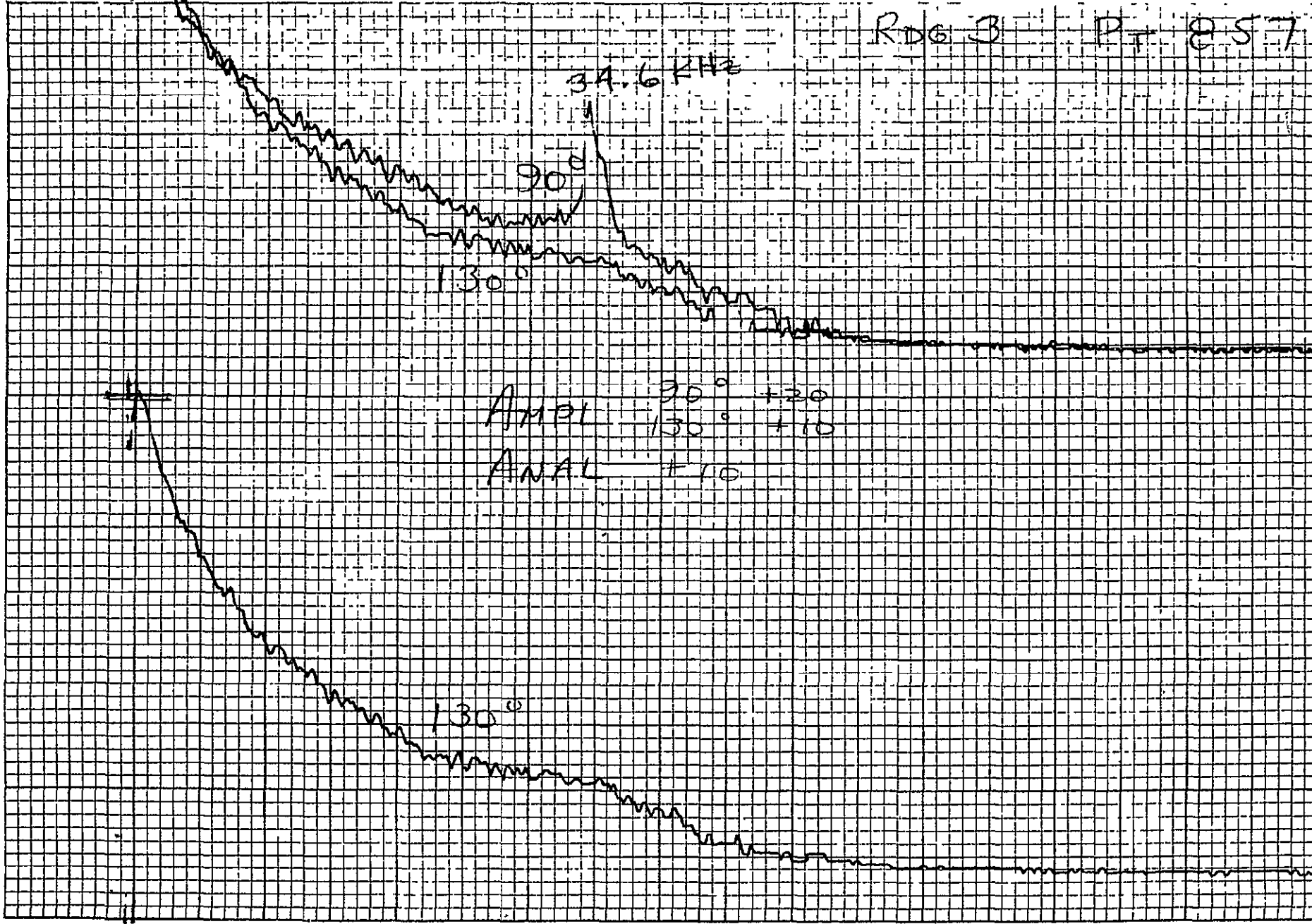
AMPL 90° +20
130° +10
ANAL +10

130°

KHz

1662

5.52



4 APR 1975

Rdg 9 Pf 858

90°

90°

+20

+10

AMPL 20° 10 db
130° 0 db

ANAL 20° (+20 db) +10 db
130° +10 db

130°

1663

5-53

0 10 20 30 40 50 60 70 80

KHz

ORIGINAL PAGE IS
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4 APR 1975

RDG 7 P- 859

130°

AMPL

90° + 10 db

130° 0 db

ANAL

+ 10 db

90°

1664

554

0

10

20

30

40

50

60

70

80

4-7-75

ROG 12 PF 859

90

AMP 90 ± 10
130 0

AMP ± 10

130

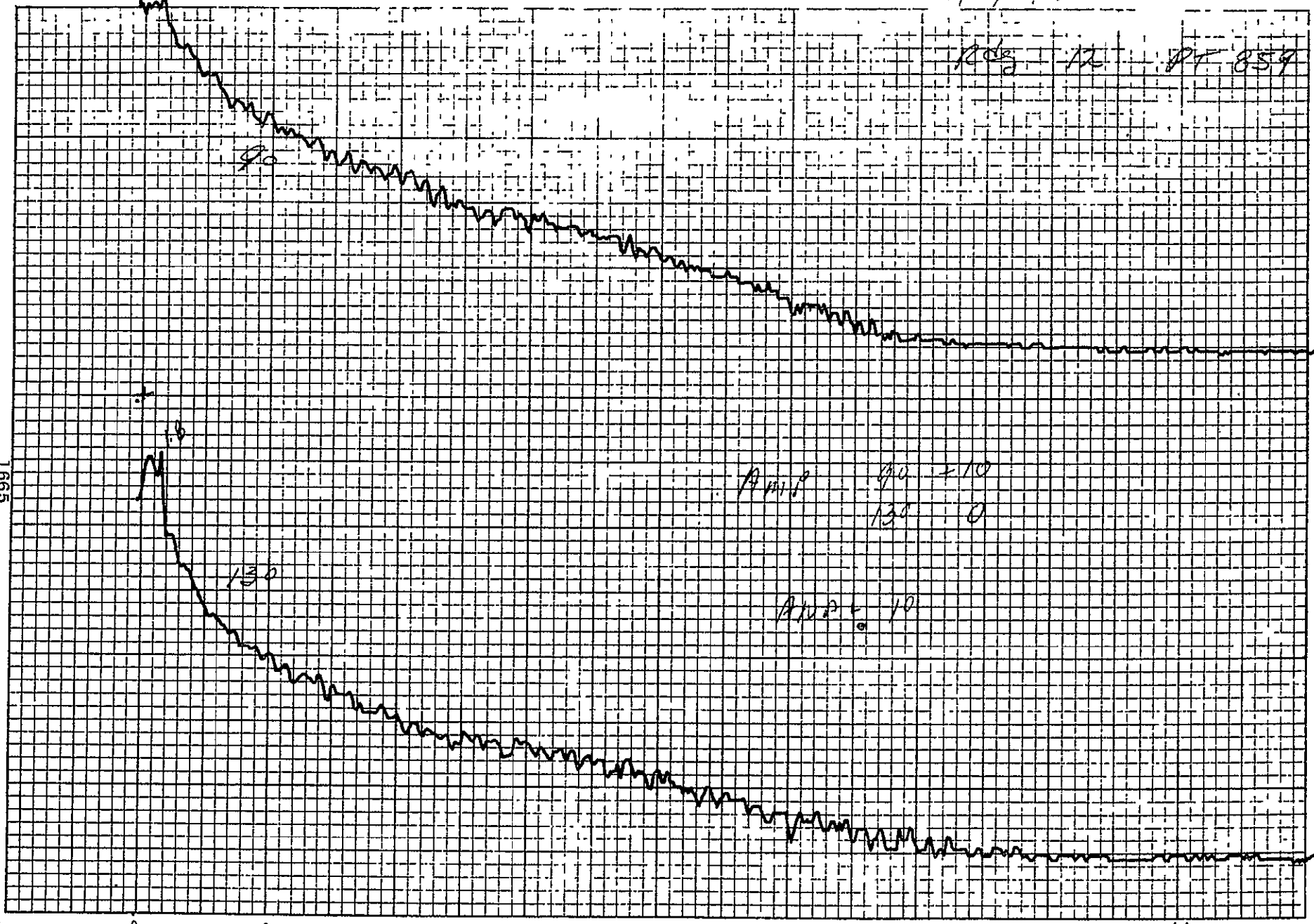
1.8

1665

5-55

K H 3

ORIGINAL PAGE IS
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4 APR 1975

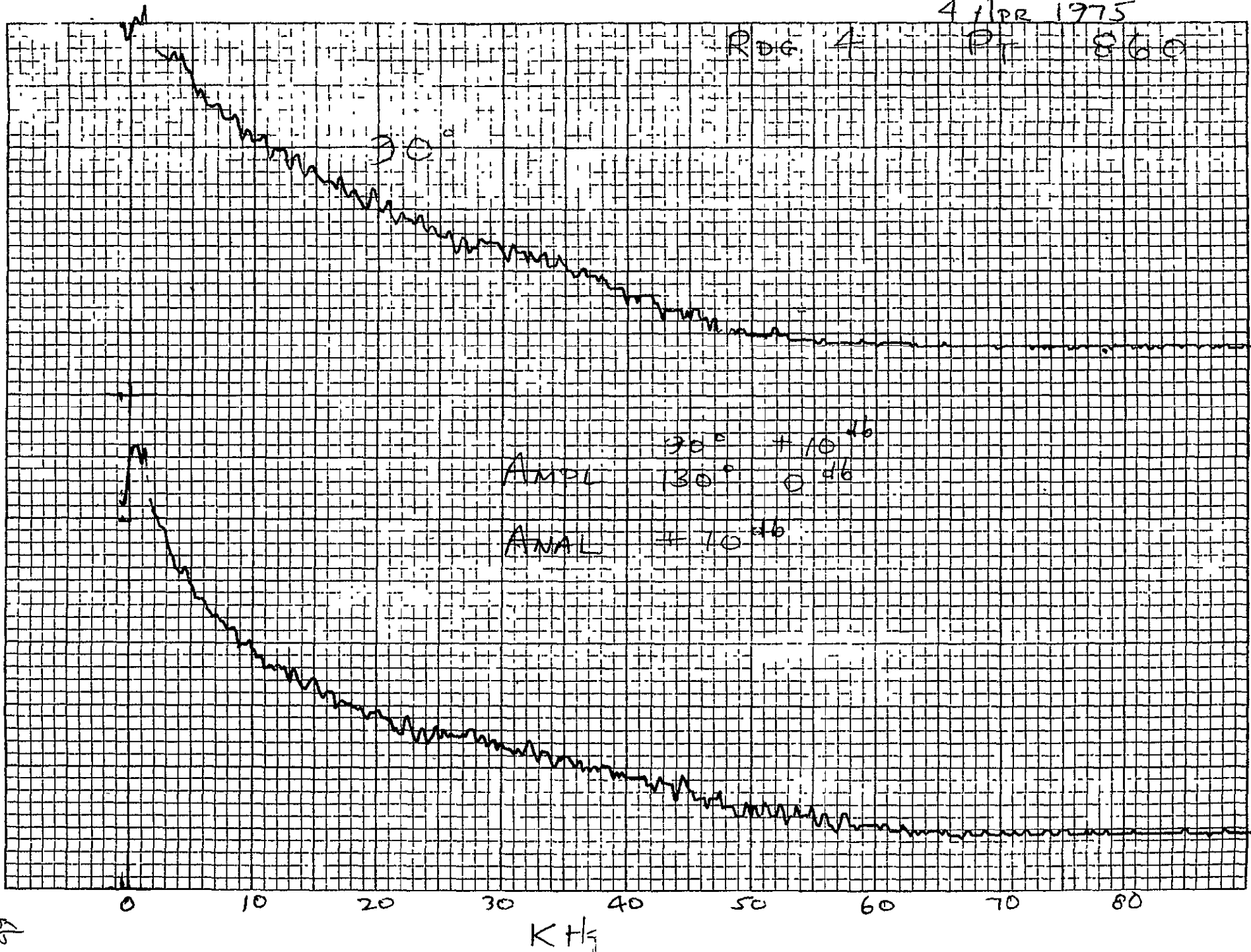
RDG. 4

PT

860

1666

5-56



6.0 AERODYNAMIC DATA FORMAT - ACOUSTIC TESTS

6.0 AERODYNAMIC DATA FORMAT - ACOUSTIC TESTS

The test conditions for the acoustic tests at JENOTS were set using the instrumentation rakes, measuring total pressure and total temperature. The fuel flow to the fan and core burners, the fan air flow, the core (primary airflow) and facility temperatures were monitored and recorded. All this basic data and the resultant calculations were processed through a Time-Sharing computer program. These results were available during the test to validate that the test conditions were as specified.

The following sample output sheet includes the physical geometry constants and reference constants, the summary results of the calculations showing pressure ratio, weight flows, temperatures, and velocities, the averages of the multiple rake input or orifice statics, and a complete listing of each individual measurement in engineering units (psia, °R). A configuration sheet defining each of the measurements is also included.

DUAL FLOW CHECKOUT

4/ 7/75 RUN: 12 RDG: 28 PNT: 815 BAROM: 14.489
 IF28 ALPHA OUT OF TABLE
 IF3 ALPHA OUT OF TABLE

LIST #13 FOL. OUTPUT

*LIST A#13"

DUAL FLOW CHECKOUT

4/ 7/75 RUN: 12 RDG: 28 PNT: 815 BAROM: 14.489

CONSTANTS

D/	=	12.0000	D8	=	4.6270	MAO-DIA=	5.0000
MAO-BET=		0.4990	SAO-DIA=		9.1500	SAO-BET=	0.6000
SGSAMP =		0.7530	TSAMP =		512.0000	SECAREA=	10.8420

CALCULATIONS

PT3/P0	=	1.590	PT28/P0	=	3.269
TT8	=	994.087 DEG. R	TT28	=	1603.352 DEG. R
WA8	=	6.066 PPS	WA28	=	6.691 PPS
WT8	=	6.104 PPS	WT28	=	6.691 PPS
WF8	=	0.038 PPS	WF28	=	0. PPS
WF1	=	0.148 PPS	WFTV	=	0.038 PPS
F/A8	=	0.006	F/A28	=	0.
GAM 8	=	1.390	GAM28	=	1.362
V8	=	1218.833 FT/SEC			
V28	=	2366.023 FT/SEC			
TS8	=	872.757 DEG. R	TS28	=	1170.578 DEG. R

```

R8      =      0.844      R28      =      1.430
F8      =      231.050  -F      F28      =      491.623  -F
AE8     =      16.092  SQ. IN  AE28     =      12.187  SQ. IN
10 LOG(R8*A8)      =      -23.003
10 LOG(R28*A28)    =      -25.485
10 LOG(R8**2*A8)   =      -36.489
10 LOG(R28**2*A28) =      -40.246

```

AVERAGES

```

IT-7MV( 0)=      0.      T-OUT ( 1)= 508.495  MAO-P1( 6)= 29.631
MAO-P2( 6)= 26.563  MAO-T1( 2)= 414.871  WFTCPS( 1)= 0.148
COREPT( 6)= 23.042  CORTT5( 2)= 948.634  FTEMPT( 1)= 512.129
SAO-P1( 4)= 48.465  SAO-P2( 2)= 48.242  SAO-TT( 2)= 526.921
WF1 ( 1)= 0.038  WF2 ( 1)= 0.      WF3 ( 1)= 0.
FTEMPT( 1)= 512.129  COR-IN( 5)= 994.087  FAI-TT( 6)= 1603.352
FAN-P1( 6)= 47.368  CORE-T( 0)= 0.

```

ENGINEERING UNITS

CHAN	DATA	CHAN	DATA	CHAN	DATA	CHAN	DATA	CHAN	DATA
3	1254.839	4	964.791	5	1443.913	7	1446.023	8	1548.147
9	10458.670	10	1012.068	18	1282.883	19	1295.630	20	1220.776
21	1396.642	23	1428.720	24	1238.253	25	1203.724	26	1209.692
27	1016.857	28	1008.585	37	994.616	38	990.668	39	991.107
40	1001.619	41	992.423	43	1622.496	44	1450.106	45	1635.601
46	1622.070	47	1639.948	48	1640.799	52	735.239	53	783.807
54	795.958	55	1176.016	57	624.300	59	984.528	61	508.495
62	524.680	63	305.062	64	526.921	65	526.921	66	512.129
68	511.631	69	512.129	70	0.	71	99.722	72	888.248
73	735.685	75	1009.020	76	581.359	77	1661.688	78	1756.255
79	990.440	102	-42.434	103	-70.285	104	-163.037	105	-37.968
106	-5756.561	107	-35.734	108	29.567	109	29.540	110	22.983
111	23.001	112	14.489	113	14.489	114	26.630	115	26.626
116	23.039	117	23.073	118	14.484	119	14.490	120	48.348
121	48.555	122	23.039	123	23.117	124	14.489	125	14.490
126	48.259	127	48.287	128	47.155	129	47.390	130	14.489
131	14.490	132	29.622	133	29.685	134	47.441	135	47.401
136	14.484	137	14.490	138	26.553	139	26.491	140	47.441
141	47.379	142	14.484	143	14.490	144	48.481	145	48.477
146	22.676	147	22.685	148	14.467	149	14.490	150	48.226
151	48.219	152	22.609	153	22.624	154	14.489	155	14.490
156	14.467	157	14.489	158	47.413	159	47.301	160	14.467
161	14.489	162	29.667	163	29.708	164	47.368	165	47.278
166	14.478	167	14.490	168	26.553	169	26.525	170	47.463
171	23.028	172	14.484	173	14.490	178	0.	179	300.154
181	145.900	182	-0.800	183	-7.600	184	289.800	202	9941.000
203	9939.000	204	9935.000	205	9942.000	206	9936.000	207	9938.000

ready

*DONE

SYSTEM ?REMO CLEARFILES

SYSTEM ?

63

COMPUTER CHANNEL	PARAMETER DESCRIPTION	LOCATION
3	T/C - T2	Support Cone - P06
4	T/C - T6	" "
5	T/C - T1	" " - P06
7	T/C - T12	Support Cone - P07
8	T/C - T16	" "
9	T/C - T18	" "
18	T/C - T4	Support Cone - P06
19	T/C - T5	" "
20	T/C - T7	" "
21	T/C - T8	" "
23	T/C - T13	Support Cone - P07
24	T/C - T14	" "
25	T/C - T15	" "
26	T/C - T17	" "
27	T/C - T20	" "
28	T/C - T21	Inner Frame - P08
37	T/C	Core T/C Rake - 0°
38	T/C	" "
39	T/C	Core T/C Rake - 180°
40	T/C	" "
41	T/C	" "
43	T/C	Fan T/C Rake - 30°
44	T/C	" "
45	T/C	" "
46	T/C	Fan T/C Rake - 210°
47	T/C	" "
48	T/C	" "
52	T/C	Fan - Outside Burner
53	T/C	Fan Elbow - Top
54	T/C	Fan Elbow - V.C.L.
55	T/C	Elbow & Plenum
57	T/C	Plenum - Inside
59	T/C	Plenum - Mid Sec. Pipe

COMPUTER CHANNEL	PARAMETER DESCRIPTION	LOCATION
61	T/C	Outside (Amb) Temp.
62	T/C	Main Air Orifice - A
63	T/C	" " " - B
64	T/C	Sec. Air Orifice - A
65	T/C	" " " - B
66	T/C	Fan P/B Fuel
68	T/C	Core P/B Fuel
69	T/C	Total Fuel
70	-	Digital Zero
71	-	Cal. 32.42
72	T/C	Core P/B Dish - T _{T5}
73		
75	T/C	Core P/B Discharge
76	T/C	Fan P/B Discharge
77	T/C	" " "
78	T/C	" " "
79	T/C	" " "
102	Press-Vent A	
103	" -Vent B	
104	" -Vent C	
105	" -Vent D	
106	" -Vent E	
107	" -Vent F	
108	PS	Main Air Orifice - Upstream
109	PS	" " " "
110	PT - 1A	Core 0° Rake
111	PT - 2A	Core 180° Rake
112	Open	
113	Open	
114	PS	Main Air Orifice - Downstream
115	PS	Main Air Orifice - Downstream
116	PT - 1B	Core 0° Rake
117	PT - 2B	Core 180° Rake
118	Open	
119	Open	
120	PS	Sec. Air Orifice - Upstream
121	PS	" " " "
122	PT - 1C	Core 0° Rake
123	PT - 2C	Core 180° Rake

COMPUTER CHANNEL	PARAMETER DESCRIPTION	LOCATION
124	Open	
125	Open	
126	PS	Sec. Air Orifice - Downstream
127	PS	" " " - "
128	PT - 1A	Fan 30° Rake
129	PT - 2A	Fan 210° Rake
130	Open	
131	Open	
132	PS - 1A	Main Air Orifice - Upstream
133	PS - 1B	Main Air Orifice - Upstream
134	PT - 1B	Fan 30° Rake
135	PT - 2B	Fan 210° Rake
136	Open	
137	Open	
138	PS - 2A	Main Air Orifice - Downstream
139	PS - 2B	Main Air Orifice - Downstream
140	PT - 1C	Fan 30° Rake
141	PT - 2C	Fan 210° Rake
142	Open	
143	Open	
144	PS - 1A	Sec. Air Orifice - Upstream
145	PS - 1B	Sec. Air Orifice - Upstream
146	PS	Core Outer - 16°
147	PS	Core Outer - 196°
148	Open	
149	Open	
150	PS - 2A	Sec. Air Orifice - Downstream
151	PS - 2B	Sec. Air Orifice - Downstream
152	PS	Core Inner - 164°
153	PS	Core Inner - 344°
154	Open	
155	Open	
156	Open	
157	Open	
158	PS	Fan Outer - 37.5°
159	PS	Fan Outer - 217.5°
160	Open	
161	Open	
162	PS - 1A	Main Air Orifice - Upstream
163	PS - 1B	Main Air Orifice - Upstream
164	PS	Fan Inner - 37.5°
165	PS	Fan Inner - 217.5°

COMPUTER CHANNEL	PARAMETER DESCRIPTION	LOCATION
166	Open	
167	Open	
168	PS - 2A	Main Air Orifice - Downstream
169	PS - 2B	" " " - "
170	PT - 2B	Fan 210° Rake
171	PT - 1B	Core 0° Rake
172	Open	
173	Open	
178	Zero	AMP - Scanner
179	Cal	Scanner
180	Jump	
181	Fuel Flow	Core Pre-Burner
182	Fuel Flow	Fan Pre-Burner
183	Open	
184	Fuel Flow	Total Flow
202	Volts	Sense
203	"	"
204	"	"
205	"	"
206	"	"
207	"	"

h-1

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7.0 LASER DATA RECORDING

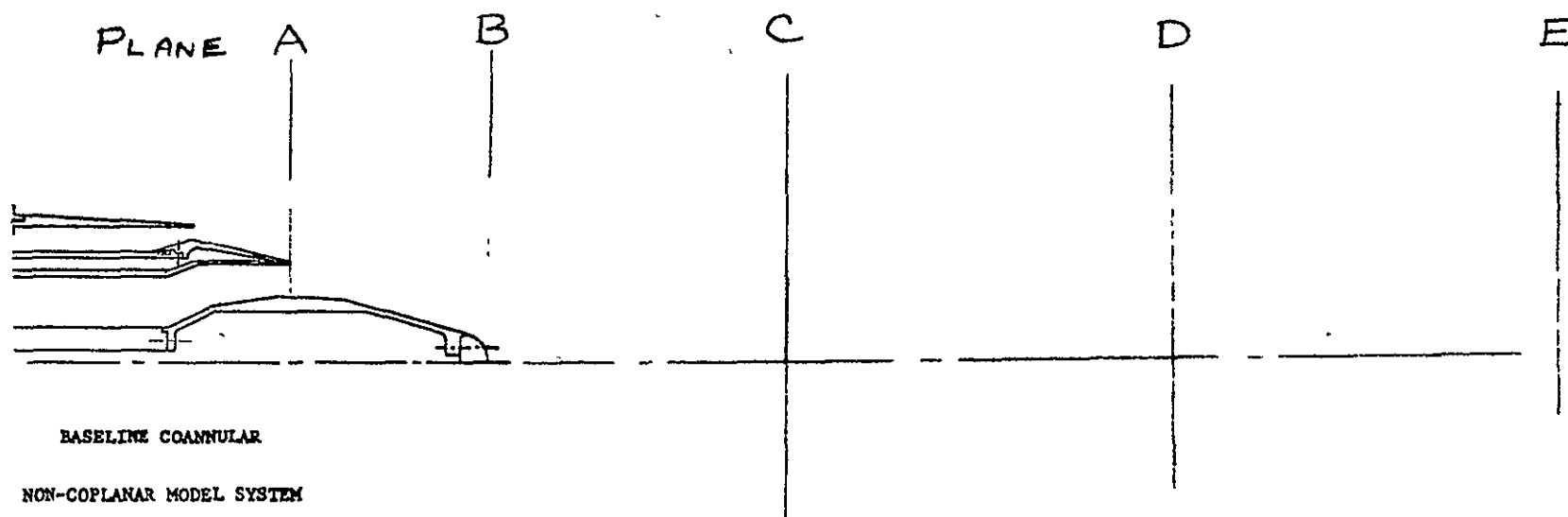
7.0 LASER VELOCIMETER DATA RECORDING

The actual process of surveying the plume of a scale model jet exhaust nozzle starts with the definition of the traverse planes of interest and the approximate number of histograms to be taken in each plane. When the test point has been set and the test conditions have stabilized, the location of the first traverse position relative to a fixed position on the nozzle at the test conditions is established. Vertical and horizontal traverses are used to verify the location of the nozzle flow centerline. A typical traverse is shown in the following pages with the histogram locations noted.

At each of the noted histogram locations, a histogram is taken, recorded with an X-Y plotter, and processed through an on-line computer. The mean velocity and turbulence level are calculated and printed out as shown.

In order to construct the velocity profile from the histograms, the recorded location of each histogram is calculated, and the mean velocity and turbulence level tabulated. These tabulations are plotted as shown in the Final Report.

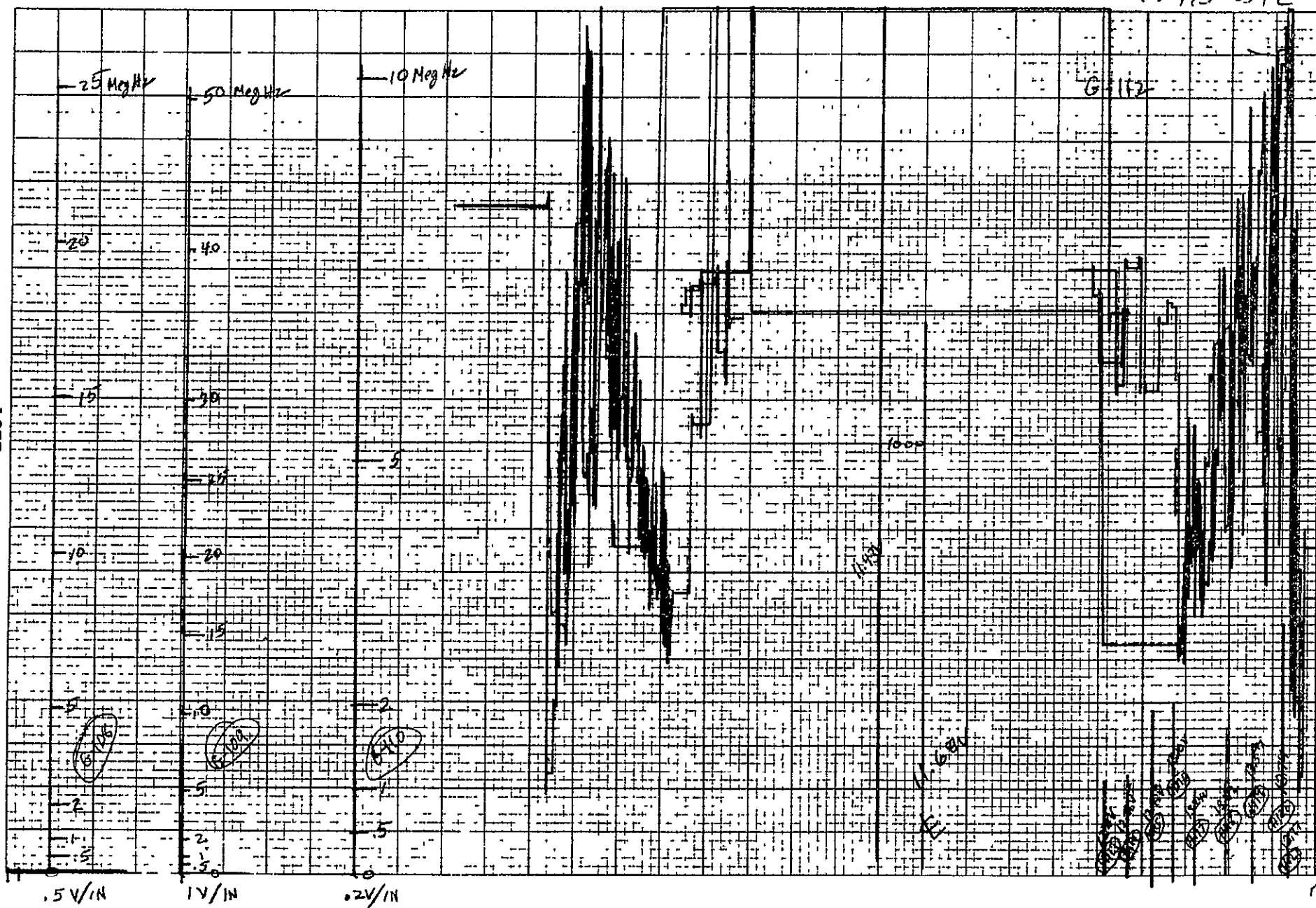
A sample of the laser velocimeter data records is included.



$$x/D_{EQ} \quad 0$$

75415-0572

1677

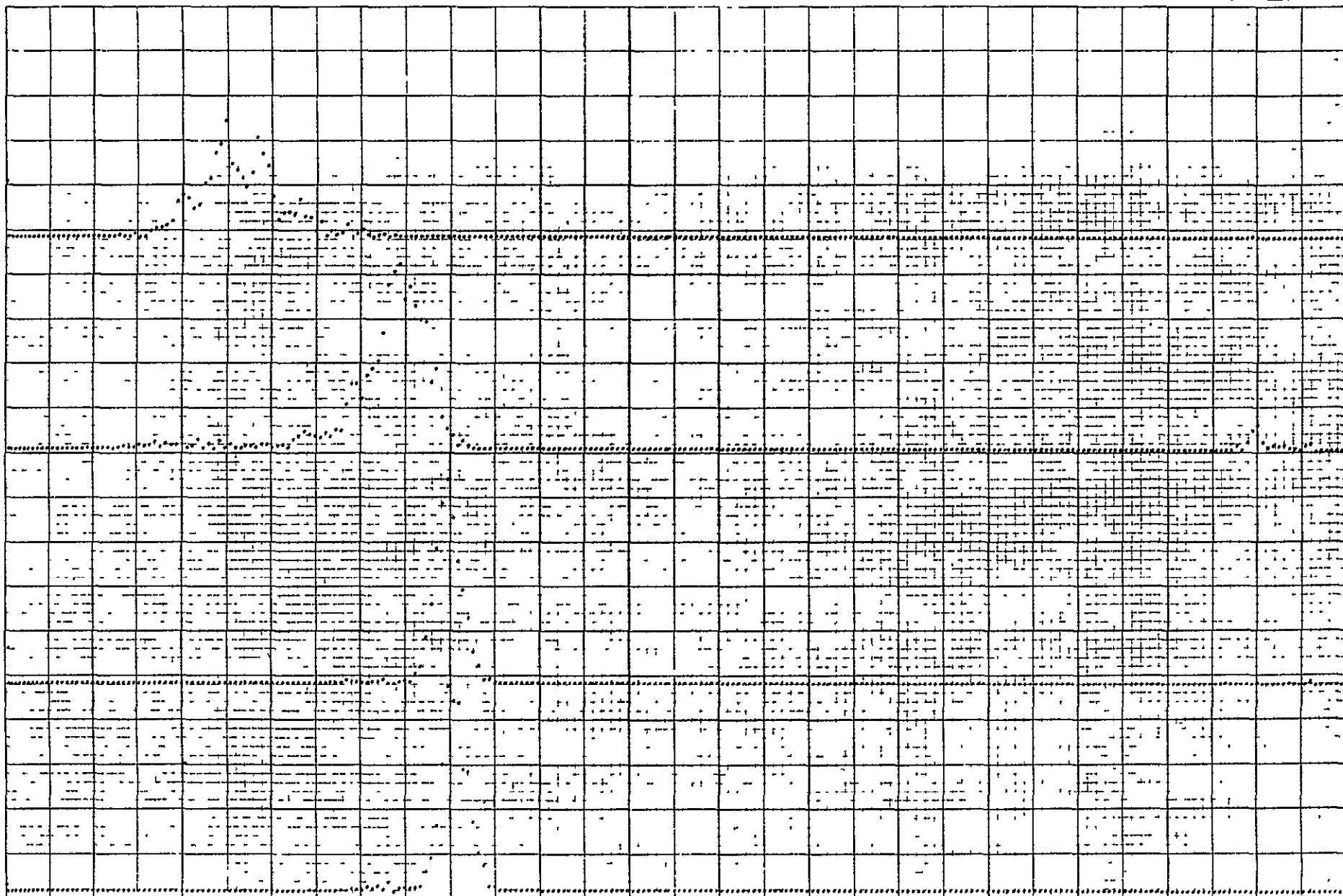


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7-3

75415-0512

1678



117

116

115

114

7-4

A large grid of graph paper, likely a ledger or a notebook page. The grid is composed of many small squares. On the right side of the page, there is handwritten text in black ink. The text is arranged in two lines: "SEE NEXT PAGE" on the top line and "MOVED" on the bottom line. The handwriting is somewhat cursive and slanted. The rest of the page is empty graph paper.

lie

Move 5

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75

C

DATE MODEL #1 LV ~~11~~ MAY 1975
12

~~FILE CHECK~~

X.O.

PT 123 ✓

F HISTGM #113

INPUT NUMBER OF DATA POINTS 1000

DELTA V 4 51

FINAL POINT NUMBER=500

PLANE A
FAN LIP
CORE EXIT

X.

113

NUMBER OF DATA POINTS = 1000

PARAMETER	VALUE	95% CONFIDENCE INTERVAL	% ERROR
MEAN	1298 479 ✓	1294 855, 1302 102	0 2791
TURBULENCE (SD)	57 295	54 815, 59 947	4 5218
TURE RATIO	0 044		

1=MOPE DATA, 2=PPINT HISTOGRAM, 3=END >3

H NUMBER #114

P HISTGM
"FIL NOT FND"

P HISTGM

INPUT NUMBER OF DATA POINTS 600

DELTA V 50°C
°C

R HISTGM

INPUT NUMBER OF DATA POINTS 600

DELTA V 4 52

FINAL POINT NUMBER=600

7-6

NUMBER OF DATA POINTS = 588.

114

ORIGINAL PAGE IS
OF POOR QUALITY

PARAMETER	VALUE	95% CONFIDENCE INTERVAL	% ERROR
MEAN	1301 114	(1296 259, 1305 970)	0 3732
TURBULENCE (SD)	58 870	(55 579, 62 462)	5 9208
TURB RATIO	0 045		

1=MORE DATA, 2=PRINT HISTOGRAM, 3=END ?3

H NUMBER 115

R HISTGM

INPUT NUMBER OF DATA POINTS 600

DELTA V 4 51

FINAL POINT NUMBER=500

NUMBER OF DATA POINTS = 600

PARAMETER	VALUE	95% CONFIDENCE INTERVAL	% ERROR
MEAN	1259 297	(1254.668, 1263 927)	0 3676
TURBULENCE (SD)	56 702	(53.563, 60 125)	5 8604
TURB RATIO	0 045		

1=MORE DATA, 2=PRINT HISTOGRAM, 3=END ?3

R HIS

H NUMBER 116

R HISTGM

INPUT NUMBER OF DATA POINTS 600

DELTA V 4.5

°C

R HISTGM

°C

°C

°C

INPUT NUMBER OF DATA POINTS R

°C

R HISTGM

1681

7-1

INPUT NUMBER OF DATA POINTS 500

DELTA V 4 45

(3)

FINAL POINT NUMBER=500

NUMBER OF DATA POINTS = 477

#116

PARAMETER	VALUE	95% CONFIDENCE INTERVAL	% ERROR
MEAN	1077.576	(1061.887, 1091.266)	1.2704
TURBULENCE (SD)	149.489	(140.253, 159.668)	6.5650
TURB RATIO	0.139		

1=MORE DATA, 2=PRINT HISTOGRAM, 3=END 73

H NUMBER 117

R HISTOGRAM

INPUT NUMBER OF DATA POINTS 500

DELTA V 4 4

FINAL POINT NUMBER=500

NUMBER OF DATA POINTS = 497

PARAMETER	VALUE	95% CONFIDENCE INTERVAL	% ERROR
MEAN	681.712	(671.482, 691.943)	1.5007
TURBULENCE (SD)	114.014	(107.126, 121.633)	6.4489
TURB RATIO	0.167		

1=MORE DATA, 2=PRINT HISTOGRAM, 3=END 73

H NUMBER 118

R HISTOGRAM

INPUT NUMBER OF DATA POINTS 500

DELTA V 4 5

FINAL POINT NUMBER=500

NUMBER OF DATA POINTS = 596

7-8

PARAMETER	VALUE	95% CONFIDENCE INTERVAL	% ERROR
	1682		

MEAN	1137.775	(1119.302,	1156.248)	1.6236
TURBULENCE (SD)	225.487	(212.965,	239.148)	5.8803
TURB RATIO	0.198			

116

④

1=MORE DATA, 2=PRINT HISTOGRAM, 3=END ?3

H NUMBER 119

R HISTGM

INPUT NUMBER OF DATA POINTS 600

DELTA V 4 53

FINAL POINT NUMBER=500

NUMBER OF DATA POINTS = 599

PARAMETER	VALUE	95% CONFIDENCE INTERVAL	% ERROR
MEAN	1370.219	(1347.478, 1392.961)	1.6597
TURBULENCE (SD)	278.295	(262.877, 295.111)	5.8653
TURB RATIO	0.203		

1=MORE DATA, 2=PRINT HISTOGRAM, 3=END ?3

H NUMBER 120

R HISTGM

INPUT NUMBER OF DATA POINTS 600

DELTA V 4 53

FINAL POINT NUMBER=500

NUMBER OF DATA POINTS = 599

PARAMETER	VALUE	95% CONFIDENCE INTERVAL	% ERROR
MEAN	1720.443	(1692.176, 1748.711)	1.6431
TURBULENCE (SD)	345.920	(326.755, 366.822)	5.8653
TURB RATIO	0.201		

1=MORE DATA, 2=PRINT HISTOGRAM, 3=END ?3

H NUMBER 121

1683

R HISTGM

79

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OF POOR QUALITY

MODEL *1

TEST 12 MAY 1975

PT 123

PLANE A

FAN LIP - CORE EXIT

 $X = 0$ inches
 VERTICAL $\phi = 11.68^\circ$

	V	ΔV	R-INCHES	V_{MEAN}	u'	u'/U
H113	12.71	1.03	2.28	1298	57	.044
H114	12.86	1.18	2.61	1301	59	.045
H115	12.99	1.31	2.90	1259	57	.045
H116	13.10	1.42	3.14	1078	149	.133
H117	13.24	1.56	3.45	682	114	.167
H118	13.42	1.74	3.85	1138	225	.198
H119	13.57	1.89	4.18	1370	278	.253
H120	13.74	2.06	4.56	1720	346	.261
H121	13.77	2.09	4.62	1572	424	.270

PLANE B

PLUG TIP

 $V = 384^\circ$
 $X = 6.15$
 VERTICAL $\phi = 11.68^\circ$

	V	ΔV	R-INCHES	V_{MEAN}	u'	u'/U
H128	12.57	.89	1.97	1251	101	.081
H129	12.71	1.03	2.28	1093	122.5	.112
H130	12.86	1.18	2.61	884	88	.100
H131	12.99	1.31	2.90	882	91	.103
H132	13.10	1.42	3.14	990	117	.118
H133	13.24	1.56	3.45	1132	121	.107
H134	13.42	1.74	3.85	1208	136	.113
H135	13.57	1.89	4.18	1072	208	.194
H136	13.74	2.06	4.56	803	225	.280
H137	13.89	2.21	4.89	547	194	.355

P_T 123

12 MAY 1975

PLANE C

VERTICAL

V = 8.23 V.

X = 15.86"

z = 11.68 V.

BASE

	V.	ΔV	R-INCHES	V _{MEAN}	u'	u'/u
H140	12.17	.49	1.08	1337	67	.050
H141	12.50	.82	1.81	1208	102	.084
H142	12.71	1.03	2.28	1076	93	.086
H143	12.99	1.31	2.90	1033	92	.089
H144	13.24	1.56	3.45	1019	113	.111
H145	13.57	1.89	4.18	866	161	.186
H146	13.89	2.21	4.89	593	167	.282
H147	14.30	2.62	5.80	340	134	.396
H148	14.10	2.42	5.35	440	150	.341

PLANE D

VERTICAL

V = 13.56

X = 27.65"

z = 11.68 V.

	V.	ΔV	R-INCHES	V _{MEAN}	u'	u'/u
H150	8.50	-3.18	-7.04	224	107	.478
H151	9.00	-2.68	-5.93	372	123	.330
H152	9.47	-2.21	-4.89	541	155	.287
H153	11.68	0	0	1310	72	.055
H154	11.93	.25	.55	1303	63	.047
H155	12.17	.49	1.08	1302	90	.063
H156	12.71	1.03	2.28	1102	121	.110
H157	12.99	1.31	2.90	992	125	.126
H158	13.24	1.56	3.45	897	140	.156
H159	13.57	1.89	4.18	776	153	.198
H160	13.89	2.21	4.89	612	156	.251

7-11

MODEL #1

TEST

12 MAY 1975

 P_T 151 P_T/P_0 $T_T - ^\circ R$ V_j FAN
CORE

1.64

775

1.5

1460

1400

PLANE A

FAN LIP - CORE EXT

 $X = .13$ $\Delta X = .06$ $V = 1.06$ VERTICAL $E = 11.68$ V ΔV

R-INCHES

 $\bar{u}$ u' $u'/\bar{u}$ ~~H162~~

CAL

 $H = 4.85$

H163

12.71

1.03

2.28

1351

41

.030

H164

12.86

1.18

2.61

1328

40

.030

H165

12.99

1.31

2.90

1312

41

.031

H166

13.10

1.42

3.14

1240

69

.056

H167

13.24

1.56

3.45

381

60

.158

H168

13.42

1.74

3.85

588

81

.137

H169

13.57

1.89

4.18

714

89

.125

H170

13.74

2.06

4.56

786

167

.213

H171

13.81

2.13

4.71

635

195

.307

 $H = 4.15 \times$

H173

13.57

1.89

4.18⁺

954

138

.144

PLANE B

 $X = 6.28$ V ΔV

R-INCHES

 $\bar{u}$ $\Delta X = 2.84$ u' $u'/\bar{u}$

H175

TRAV

H176

12.15

0.47

1.04

1284

32

.025

H177

12.57

0.89

1.97

1332

64

.048

H178

12.71

1.03

2.28

1210

137

.113

H179

12.85

1.17

2.59

735

152

.207

H180

12.99

1.31

2.90

556

64

.116

H182

13.42

1.74

3.85

627

65

.104

H183

13.57

1.89

4.18

541

95

.176

H184

13.74

2.06

4.56

394

113

.286

H185

13.89

2.21

4.89

257

101

.393

H186

12.78

1.10

2.43

989

187

.189

H181

~~H186~~

13.24

1.56

3.45

630

59

.093

MODEL * 1

TEST 12 MAY 1975

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OF POOR QUALITY P_T 151

PLANE C

 $X = 16.0''$ $\Delta X = 7.23$ VERT. $z = 11.68$

	V	ΔV	R-INCHES	$\bar{u}$	u'	$u'/\bar{u}$
H190	11.68	0	0	1285	77	.060
H191	12.17	0.49	1.08	1382	39	.028
H192	12.50	0.82	1.81	1266	118	.093
H193	12.71	1.03	2.28	963	174	.180
H194	12.99	1.31	2.90	654	73	.111
H195	13.23	1.55	3.43	563	63	.112
H196	13.58	1.90	4.20	462	84	.181
H197	13.89	2.21	4.89	338	88	.260

PLANE D

 $X = 27.7''$ $\Delta X = 12.56$

	V	ΔV	R-INCHES	$\bar{u}$	u'	$u'/\bar{u}$
H199	13.89	2.21	4.89	334	94	.280
H200	9.47	2.21	4.89	315	89	.284
H201	11.68	0	0	1315	61	.047
H202	11.97	0.29	.64	1353	62	.046
H203	12.17	0.49	1.08	1329	86	.065
H204	12.50	0.82	1.81	1131	164	.145
H205	12.71	1.03	2.28	907	172	.190
H206	12.99	1.31	2.90	689	131	.190
H207	13.24	1.56	3.45	550	106	.193
H208	13.57	1.89	4.18	431	99	.229

MODEL #1

TEST 12 MAY 1975

P_T 125

P_T/P_0

T_T

V_J

FAN

39

1960

2800

CORE

1.5

1460

1400

PLANE A

$X = 0.13''$

$\Delta X = 0.6$

VERT

$E = 11.68$

$\bar{V}$

ΔV

R-INCHES

$\bar{U}$

u'

$u'/\bar{U}$

H210

12.99

1.31

2.90

1272

47

.037

H211

12.71

1.03

2.28

1318

48

.036

H236

?

?

?

2448

247

.101

PLANE B

$X = 6.46''$

$\Delta X = 2.92$

R-INCHES

$\bar{U}$

u'

$u'/\bar{U}$

H213

10.79

0.89

1.97

1301

26

.028

H214

10.65

1.03

2.28

1296

60

.046

H215

10.50

1.18

2.61

1253

88

.070

H216

10.37

1.31

2.90

1329

132

.099

H217

10.12

1.56

3.45

1698

160

.094

H218

9.94

1.74

3.85

1605

241

.150

MODEL #1

TEST

12 MAY 1975

P_T ~~125~~ 125ORIGINAL PAGE IS
OF POOR QUALITYPLANE C X = 16.0"
VERT Z = 11.68 $\Delta X = 7.23$

	V	ΔV	R-INCHES	$\bar{u}$	u'	$u'/\bar{u}$
H221	11.68	0	0	1296	86	.066
H222	11.19	0.49	1.08	1295	97	.075
H223	10.50	1.18	2.61	1427	117	.082
H224	9.47	2.21	4.89	1294	232	.179
H225	9.78	1.90	4.20	1082	270	.249
H226	9.59	2.09	4.62	819	218	.266
→ H224	9.95	1.73	3.83	1294	232	.179

PLANE D X = 27.7"

 $\Delta X = 12.56$

	V	ΔV	R-INCHES	$\bar{u}$	u'	$u'/\bar{u}$
H228	11.68	0	0	1326	82	.062
H229	10.50	1.18	2.61	1381	110	.080
H230	10.12	1.56	3.45	1270	206	.162
H231	9.79	1.89	4.18	954	245	.257
H232	9.59	2.09	4.62	864	235	.272
H233	10.79	0.89	1.97	1346	100	.074
H234	11.19	0.49	1.08	1303	95	.073

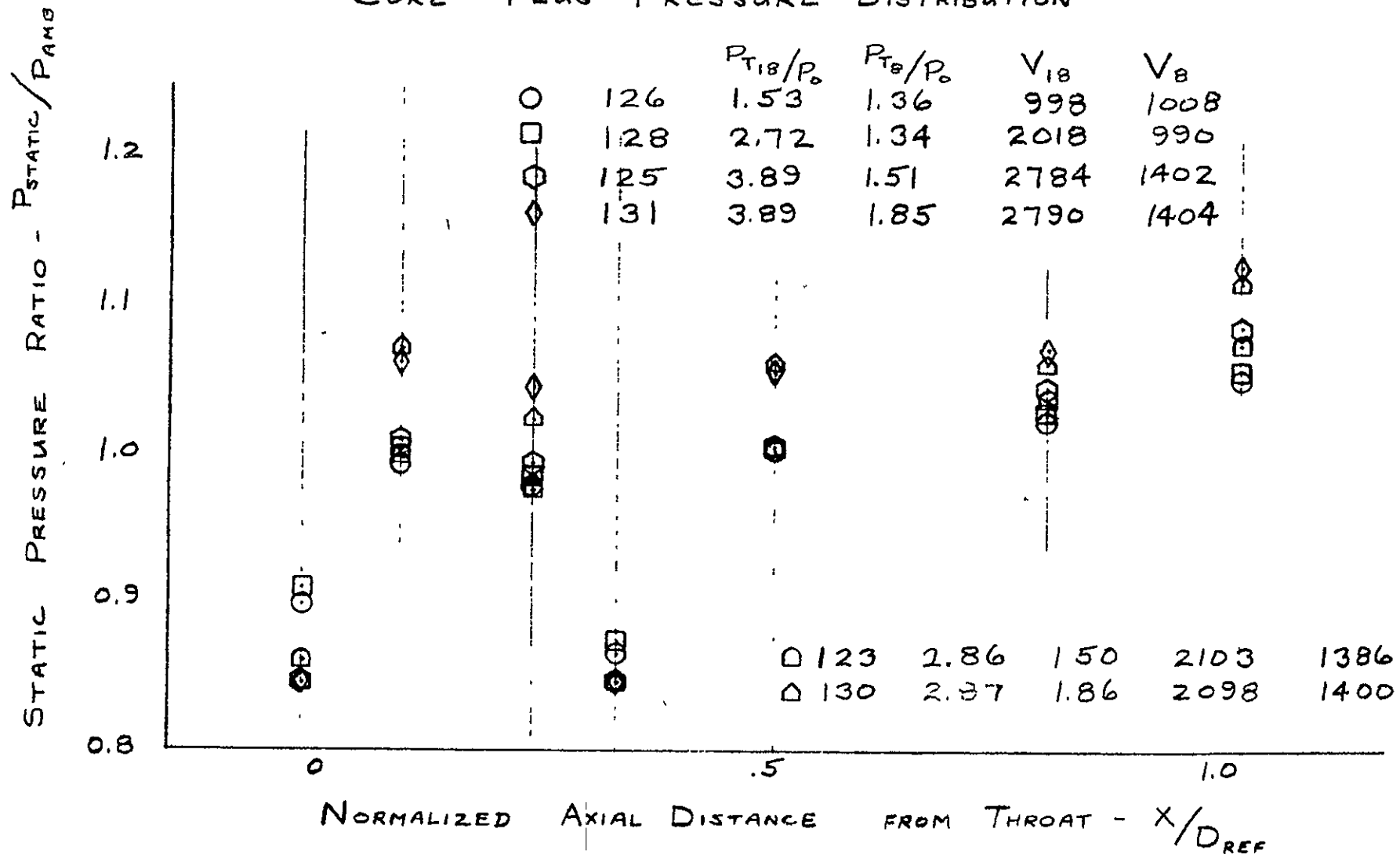
8.0 STATIC PRESSURES - ACOUSTIC MODELS

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8.0 STATIC PRESSURES - ACOUSTIC MODELS

The static pressure data from the acoustic test runs are tabulated for selected conditions.

CORE PLUG PRESSURE DISTRIBUTION



CHUTE SUPPRESSOR WITHOUT EJECTOR
CONFIGURATION 1

STATIC PRESSURE RATIO - $P_{\text{STATIC}}/P_{\text{AMB}}$

CORE PLUG PRESSURE DISTRIBUTION

1.2
1.1
1.0
0.9
0.8

NORMALIZED AXIAL DISTANCE FROM THROAT - X/D_{REF}

CHUTE SUPPRESSOR WITHOUT EJECTOR
CONFIGURATION 1

		P_{T18}/P_0	P_{T8}/P_0	V_{18}	V_8
◇	113	2.45	1.56	1801	1197
△	115	3.27	1.56	2396	1209
□	123	2.86	1.50	2103	1386
○	125	3.89	1.51	2784	1402

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- MODEL #1 -

MULTI-CHUTE

FAN PLUG

FEC N-AXIAL & CW.

GE
LINE

Flow

Corner

Chute

✓	51	2.38	355°	155
	50	2.000	345°	
✓	49	1.625	335°	149
✓	48	1.272	355°	143
✓	47	1.005	345°	137
✓	46	.832	335°	131
	45	.680	355°	
✓	44	.315	345°	125
✓	43	-.145	335°	119
	42	-.220	355°	
✓	41	1.005	90°	113
	40	.832	80°	
✓	39	.680	70°	172
✓	38	.315	90°	166
✓	37	-.145	80°	160
✓	36	-.220	70°	154

Chute Base T-RADIUS

52	3.83	0°	161
53	3.98	10°	
54	4.13	20°	167
55	4.28	30°	
56	4.43	40°	173
57	4.58	50°	
58	4.72	60°	

PT

MODEL #1

MULTI-CHUTE FAN SUPPRESSOR

CORE PLUG
STATICS

X

FAN PLUG
STATICS

LINE

112

51

-0.1

118

53

.57

124

55

1.44

130

57

1.98

136

60

~~2.4~~ 3.03

142

62

4.84

148

64

6.15

LINE

154

36

160

37

166

38

172

39

113

41

119

43

125

44

131

46

137

47

143

48

149

49

155

51

CHUTE BASE

161

52

167

54

173

56

85

MODEL #1

P_T 113

MULTI-CHUTE FAN SUPPRESSOR

CORE PLUG STATICS

FAN PLUG STATICS

LINE

112	12.172 Cavity	.845
118	14.430	1.002
124	14.186	.985
130	12.172 Cavity	.845
136	14.509	1.007
142	14.931	1.037
148	15.524	1.078

LINE

154	14.329	.995	36
160	14.321	.994	37
166	14.246	.989	38
172	13.413	.931	39
113	13.570	.942	41
119	15.247	1.058	43
125	13.784	.957	44
131	12.995	.902	46
137	13.464	.935	47
143	13.852	.962	48
149	13.948	.968	49
155	14.446	1.003	51

CHUTE BASE

161	14.079	.978
167	14.125	.981

P_{A amb} = 14.403

	P _T /P ₀	T _T	V _T
P _T 113			
CORE	1.56	1002	1197
FAN	2.45	1188	1801

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PT 115
ORIGINAL PAGE IS
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MODEL #1

MULTI-CHUTE FAN SUPPRESSOR

CORE PLUG STATICS

FAN PLUG STATICS

LINE			LINE		
112	12.172 cavity	.845	154	14.035	.996
118	14.373	.998	160	14.207	.986
124	14.204	.986	166	14.152	.982
130	12.172 cavity	.845	172	12.760	.886
136	14.519	1.008	113	13.088	.908
142	15.013	1.042	119	16.090	1.117
148	15.632	1.085	125	14.474	1.005
			131	12.379	.859
			137	13.005	.903
			143	13.562	.941
			149	13.746	.954
			155	14.461	1.004

CHUTE BASE

161	13.999	.972
167	14.034	.974

$$P_{AMB} = 14.406$$

PT 115	P_T/P_0	T_T	V_T
CORE	1.57	1004	1209
FAN	3.27	1642	2396

MODEL #1

P_T 123

MULTI-CHUTE FAN SUPPRESSOR

CORE PLUG
STATICS

FAN PLUG
STATICS

LINE			LINE		
112	12.404	.860	154	{14.135	.980
118	14.411	.9996	160	{14.439	1.002
124	14.108	.976	166	{14.300	.992
130	12.180	.845	172	{13.342	.925
136	14.478	1.004	113	{13.440	.932
142	14.929	1.036	119	17.318	1.201
148	15.466	1.073	125	15.307	1.062
			131	12.884	.894
			137	13.446	.933
			143	13.576	.942
			149	13.669	.948
			155	14.271	.990

CHUTE BASE

161	14.298	.992		
167	14.289	.991		

$$P_{AMB} = 14.416$$

	P _T 123	P _T / P ₀	T _T	V _J
CORE		1.50	1457	1386
FAN		2.86	1405	2103

MODEL * 1

P_T 125

MULTI-CHUTE FAN SUPPRESSOR

CORE PLUG STATICS

FAN PLUG STATICS

LINE			LINE		
51	112	12.181 cavity .845	154	14.141	.981
53	118	14.549 1.009	160	13.321	.924
55	124	14.305 .992	166	15.338	1.064
57	130	12.181 cavity .845	172	12.181 cavity .845	.845
60	136	14.483 1.005	113	12.992	.901
62	142	15.031 1.043	119	19.565	1.357
64	148	15.633 1.084	125	15.655	1.086
			131	11.995	.832
			137	12.825	.890
			143	13.232	.918
			149	13.232	.918
			155	14.468	1.004

CHUTE BASE

161	14.308	.9925
167	14.271	.990

$$P_{AMB} = 14.416$$

P _T 125	P _r /P ₀	T _T	V _T
CORE	1.51	1471	1402
FAN	3.89	1968	2784

MODEL #1

PT 126

MULTI-CHUTE FAN SUPPRESSOR

CORE PLUG
STATICSFAN PLUG
STATICS

LINE

112	12.943	.898
118	14.320	.993
124	14.107	.978
130	12.456	.864
136	14.433	1.001
142	14.725	1.021
148	15.113	1.048

LINE

154	14.320	.993
160	14.379	.997
166	14.276	.990
172	14.007	.971
113	14.062	.975
119	14.887	1.032
125	14.088	.977
131	13.903	.964
137	14.039	.974
143	14.162	.982
149	14.214	.986
155	14.422	1.0001

CHUTE BASE

161	14.341	.9945
167	14.374	.997

 $P_{AMB} = 14.420$

PT 126

 P_T / P_0 T_T V_T

CORE

1.36

1004

1008

FAN

1.53

724

998

MODEL #1

P_T 128

MULTI-CHUTE FAN SUPPRESSOR

CORE PLUG STATICS

FAN PLUG STATICS

LINE			LINE		
112	13.097	.909	154	14.274	.991
118	14.467	1.004	160	14.274	.981
124	14.175	.984	166	14.130	.994
130	12.565	.872	172	14.317	.922
136	14.445	1.003	113	13.281	.936
142	14.810	1.028	119	13.477	1.049
148	15.196	1.055	125	15.107	.938
			131	13.510	.885
			137	12.744	.918
			143	13.220	.956
			149	13.766	.964
			155	13.888	1.005
				14.473	

CHUTE BASE

161	14.115	.980
167	14.296	.992

$$P_{AMB} = 14.406$$

P _T 128	P _T /P ₀	T _T	V _J
CORE	1.34	1004	990
FAN	2.725	1351	2018

MODEL #1

P_T 130

MULTI-CHUTE FAN SUPPRESSOR

CORE PLUG
STATICS

LINE		
112	12.173	.845
118	15.422	1.070
124	14.731	1.022
130	12.173	.845
136	15.269	1.060
142	15.236	1.058
148	16.043	1.114

FAN PLUG
STATICS

LINE		
154	14.113	.980
160	14.264	.990
166	14.311	.993
172	13.121	.911
113	13.334	.926
119	15.914	1.105
125	14.186	.985
131	12.791	.888
137	13.301	.923
143	13.595	.944
149	13.780	.956
155	14.311	.993

CHUTE BASE

161	14.076	.977
167	14.197	.985

$$P_{AMB} = 14.407$$

P_T 130

P_T/P₀

T_T

V_T

CORE

1.86

1002

1400

FAN

2.87

1398

2098

MODEL #1

Pt 131

MULTI-CHUTE FAN SUPPRESSOR

CORE PLUG STATICS

FAN PLUG STATICS

LINE

112	12.180	.845
118	15.307	1.062
124	15.044	1.044
130	12.179	.845
136	15.201	1.054
142	15.407	1.069
148	16.214	1.125

LINE

154	13.216	.917
160	13.026	.904
166	15.499	1.075
172	12.180	.845
113	12.948	.898
119	17.571	1.219
125	15.118	1.048
131	11.997	.832
137	12.843	.891
143	13.243	.918
149	13.218	.917
155	14.443	1.002

CHUTE BASE

161	14.321	.993
167	14.273	.990

$$P_{AMB} = 14.418$$

Pt 131

P_t/P_0

T_T

V_J

CORE

1.85

1015

1404

FAN

3.89

1977

2790

MODEL # Z

MULTI-TUBE

FAN PLUG STATICS

FEC	M - AXIAL	4 CW	Behind Inner Row Tube	Behind Middle Tube
49	2.38	0	✓	
48	2.038	15.62°	✓	
47	1.655	31.30°	✓	
46	1.292	0	✓	
45	1.000	15.62°	✓	
44	.835	31.30°	✓	
43	.560	0	✓	
42	.080	15.62°	✓	
41	-.300	31.30°	✓	
40	1.292	54.78°		✓
39	1.000	39.16°		✓
38	.835	23.53°		✓
37	.560	54.78°		✓
36	.080	39.16°		✓

$$\Delta \theta = 15.652^\circ$$

23 Tube Row

MODEL # 7

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MULTI TUBE

FAN PLUG STATICS

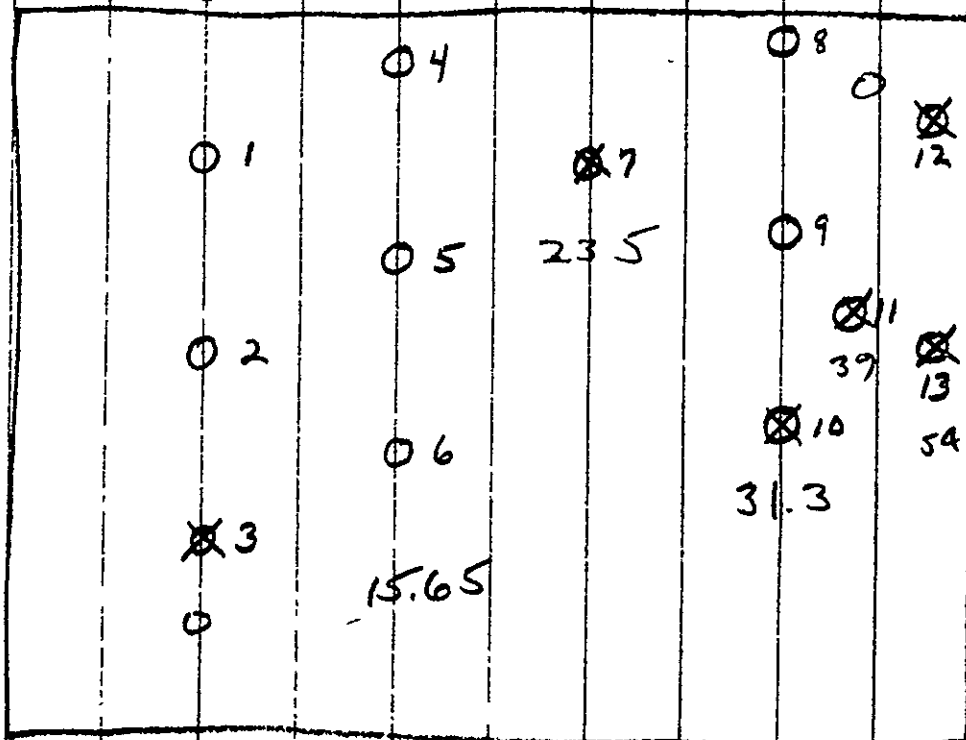
GE	FEC	N	AXIAL	ϕ C.W.	Behind Inner Tube	Behind Middle Tube
3-NG	49	2	38	0	✓	
6	48	161	20.38	15.62"	✓	
10-NG	47		1.655	31.30"	✓	
2	46	143	1.292	0	✓	
5	45	155	1.000	15.62"	✓	
9	44	173	.835	31.30"	✓	
1	43	137	.560	0	✓	
4	42	149	.080	15.62"	✓	
8	41	167	.300	31.30"	✓	
13	40		1.292	54.78"		✓
11	39		1.000	33.16"		✓
7-NG	38		.835	23.53"		✓
12	37		.560	54.78"		✓
	36		.080	33.16"		✓

$\Delta \theta = 15.652^\circ$ 23 Tube Row

TDC
↓

↓
FLOW

FAN NO 2,
OUTER STATICS
4-21-75



Ps #	SCANNER	COMP. Pos
#1	F-6	137
2	F-7	143
4	F-8	149
5	F-9	155
6	F-10	161
8	F-11	167
9	F-12	173

*2
MODEL

1, 4

ORIGINAL PAGE 7
OF POOR QUALITYP_T 210

MODEL #2

CORE Plug
STATICS
psiaFAN Plug
STATICS
psia

112	12.312	.847	137	13.770	.947
118	13.697	.942	143	13.618	.936
124	14.517	.998			
130	14.700	1.011	149	13.810	.950
136	14.725	1.0125	155	13.485	.927
142	13.664	.9395	161	13.960	.960
148	12.313	.847			
154	12.853	.884	167	13.650	.938
160	14.505	.997	173	13.563	.933
166	14.915	1.026			
172	15.125	1.040			
113	15.189	1.044			
119	15.086	1.037			
125	15.865	1.091			
131	16.047	1.103			

P_{amb} ~ 14.543 psiaP_T/P₀ T_T V_J

FAN

3.01

1495

2214

CORE

1.63

776

1097

1707

8-17

12, *6
1, *4

P_T 215

MODEL # 2

CORE PLUG
STATICS
psia

FAN PLUG
STATICS
psia

112	12.310	.8465	137
118	13.856	.953	143
124	14.414	.991	
130	14.639	1.007	149
136	14.604	1.004	155
142	13.610	.936	161
148	12.311	.8465	
154	13.455	.925	167
160	14.481	.996	173
166	14.861	1.022	
172	15.090	1.038	
113	15.186	1.044	
119	15.106	1.039	
125	15.786	1.086	
131	15.963	1.098	

13.660	.939
13.522	.930
13.738	.945
13.410	.922
13.889	.955
13.636	.938
13.368	.919

P_{amb} ~ 14.542 psia

P_T/P₀

T_T

V_J

FAN

3.28

1632

2390

CORE

1.57

1010

1211

PT 220

MODEL # 2

CORE Plug
STATICS
psia

FAN Plug
STATICS
psia

112	12.302	.847	137	13.694	.943
118	13.960	.961	143	13.580	.935
124	14.422	.993			
130	14.618	1.006	149	13.719	.944
136	14.573	1.003	155	13.445	.925
142	13.593	.936	161	13.832	.952
148	12.302	.847			
154	13.599	.936	167	13.166	.906
160	14.477	.996	173	13.167	.906
166	14.832	1.021			
172	15.062	1.037			
113	15.174	1.044			
119	15.117	1.040			
125	15.772	1.086			
131	15.922	1.096			

$P_{amb} = 14.528$ psia

P_T/P_0 T_r V_J

FAN 3.56 1782 2571

CORE 1.54 1233 1315

2, *6
1, *4

P_T 223

MODEL # 2

CORE PLUG
STATICS
psia

FAN PLUG
STATICS
psia

112	14.479	? .998	137
118	14.034	.968	143
124	14.536	1.002	
130	14.592	1.006	149
136	14.476	.998	155
142	13.268	.915	161
148	13.616	.870	
154	13.543	.934	167
160	14.430	.925	173
166	14.709	1.014	
172	14.935	1.030	
113	15.020	1.036	
119	14.969	1.032	
125	14.530	1.002	
131	15.709	1.083	

13.897	.958
13.764	.949
13.804	.952
13.686	.944
14.000	.965
13.359	.921
13.511	.932

P_{amb} ~ 14.504 psia

FAN

P_T/P₀

T_r

V_J

2.87

~~1442~~
1442

2132

CORE

1.50

1465

1395

1,4

P_T 205

MODEL # 2

ORIGINAL PAGE IS
OF POOR QUALITY

CORE Plug
STATICS
psia

FAN Plug
STATICS
psia

X					
-0.1	112	21	12.343	.846	137
18	118	22	12.342	.846	143
57	124	23	15.160	1.041 1.040	
1.03	130	24	15.020	1.041 1.03	149
1.44	136	25	15.173	1.041	155
1.80	142	26	14.147	.971	161
1.98	148	27	12.342	.846	
2.16	154	28	12.342	.846	167
2.49	160	29	14.397	.988	173
3.03	166	30	15.331	1.052	
3.84	172	31	15.284	1.049	
4.84	178	32	15.293	1.050	
5.53	184	33	15.112	1.038	
6.15	190	34	16.048	1.101	
6.59	196	35	16.286	1.118	

13.984	.960
13.845	.950
14.063	.965
13.685	.939
14.067	.965
13.875	.952
13.583	.932

P_{amb} ~ 14.573 psia

P_T/P₀ T_r V₅

FAN - 28

2.72 1342 2010

CORE - 8

1.80 552 1010

2, °C
1, °4

P_T 225

MODEL # 2

CORE Plug
STATICS
psia

FAN Plug
STATICS
psia

112	12.284	.847	137	13.455	.927
118	13.757	.948	143	13.430	.926
124	14.347	.989			
130	14.578	1.005	149	13.579	.936
136	14.536	1.002	155	13.437	.926
142	13.675	.942	161	13.793	.951
148	10.284	.847			
154	13.749	.948	167	12.929	.891
160	14.476	.998	173	13.139	.906
166	14.803	1.020			
172	15.038	1.036			
113	15.161	1.045			
119	15.140	1.043			
125	15.696	1.082			
131	15.808	1.090			

P_{amb} ~ 14.509 psia

P_T/P₀ T_r V_J
FAN 3.90 1986 2799

CORE 1.50 1452 1380

Pt 237

MODEL # 2

CORE Plug
STATICS
psia

FAN Plug
STATICS
psia

112	14.448	1.000	137
118	12.216	.846	143
124	14.355	.994	
130	14.491	1.003	149
136	14.542	1.007	155
142	13.306	.921	161
148	12.444	.861	
154	12.782	.885	167
160	14.398	.997	173
166	14.820	1.026	
172	15.027	1.040	
113	15.087	1.044	
119	14.977	1.037	
125	14.535	1.006	
131	15.865	1.098	

13.992	.969
13.848	.953
13.805	.956
13.804	.956
13.995	.969
13.605	.942
13.521	.936

$P_{amb} \approx 14.445$ psia

P_T/P_0

T_r

V_J

FAN

2.60

1706

2226

CORE

1.63

778

1102

2, 6
1, 4

P_T 254

MODEL # 2

CORE PLUG
STATICS
psia

FAN PLUG
STATICS
psia

112	14.497	.9995	137
118	12.282	.847	143
124	14.917	1.028	
130	14.649	1.010	149
136	14.642	1.0095	155
142	13.457	.928	161
148	12.282	.847	
154	12.282	.847	167
160	14.198	.979	173
166	14.885	1.026	
172	14.923	1.032	
113	14.977	1.033	
119	14.803	1.021	
125	14.548	1.003	
131	15.977	1.101	

14.254	.983
14.247	.982
14.267	.984
14.199	.979

14.378	.991
14.185	.978

P_{amb} ~ 14.504 psia

P_T/P₀ T_r V_J

FAN

1.50 .727 974

CORE

1.74 1460 1608

L-1, 4

PT 257

MODEL # 2

ORIGINAL PAGE IS
OF POOR QUALITYCORE Plug
STATICS
psiaFAN Plug
STATICS
psia

112	14.514	1.0006	137	14.233	.981
118	12.841	.885	143	14.210	.980
124	14.062	.969			
130	15.164	1.045	149	14.236	.981
136	15.086	1.040	155	14.141	.975
142	14.355	.990	161	14.313	.987
148	12.284	.847			
154	12.283	.847	167	14.322	.987
160	12.282	.847	173	14.105	.972
166	15.074	1.039			
172	15.777	1.088			
113	15.266	1.052			
119	15.040	1.037			
125	14.569	1.004			
131	16.320	1.125			

 $P_{amb} \approx 14.506$ psia P_T/P_0 T_T V_J

FAN

1.59

787

1086

CORE

2.05

1459

1807

2, *6
1, *4

P_T 260

MODEL #2

CORE PLUG
STATICS
psia

FAN PLUG
STATICS
psia

112	14.481	.998
118	15.324	1.056
124	15.140	1.044
130	12.491	.861
136	15.497	1.068
142	14.889	1.026
148	12.285	.847
154	12.283	.847
160	12.283	.847
166	12.395	.854
172	16.831	1.160
113	15.699	1.082
119	15.994	1.102
125	14.567	1.004
131	16.410	1.131

137	14.188	.978
143	14.158	.976
149	14.146	.975
155	14.062	.969
161	14.249	.982
167	14.112	.973
173	14.046	.966

P_{amb} ~ 14.506 psia

	P _T /P ₀	T _T	V _T
FAN	1.725	833	1202
CORE	2.46	1455	2002

PLUG - STATICS

ORIGINAL PAGE IS
OF POOR QUALITY

P_T 270

14.446 psia = P_{amb}

Bar

THREAT

CORE PLUG

14.448
14.083
14.101
14.149
14.134
14.153
14.138
14.125
14.279
14.068
14.068
14.299
14.563
14.457
15.107

P_T 270

P_{T10}/P₀ = 3.85

T_{T10} = 1967

V₁₀ = 2775

P_{T8}/P₀ = .983

V₈ = 0

TIP

FAN PLUG

P_T

271

270

272

1

13.86

13.653

13.915

2

13.728

13.568

13.845

4

13.838

13.441

13.971

5

13.746

13.581

13.817

6

13.986

13.844

14.048

8

13.522

12.825

13.831

9

13.542

13.316

13.675

4/7/1

PLUG STATICS

PT 271

$$14.445 \text{ psia} = P_{\text{amb}} \quad \text{BAR}$$

THREAT

14.454

14.232

14.244

14.272

14.265

14.272

14.298

14.265

14.338

14.228

14.255

14.487

14.709

14.463

15.010

Tip

CORE PLUG

$$P_{T18}/P_0 = 2.83$$

$$T_{T18} = 1394$$

$$V_{18} = 2083$$

$$P_{T0}/P_0 = .99$$

$$V_0 = 0$$

FAN PLUG

1 13.86

2 13.728

4 13.838

5 13.746

6 13.986

8 13.522

9 13.542

PLUG STATICS

P_T 272

ORIGINAL PAGE IS
OF POOR QUALITY

$$14.492 \text{ psia} = P_{amb} \quad \text{BAR}$$

14.373
14.395
14.417
14.450
14.440
14.442
14.450
14.454
14.454
14.450
14.431
14.436
14.498
14.617
Tip 14.716

P_T 272

$$P_{T_{18}}/P_0 = 2.44$$

$$T_{T_{18}} = 1214^\circ R$$

$$V_{18} = 1817$$

$$P_{T_8}/P_0 = 1.003$$

$$V_8 = 83.8$$

FAN PLUG

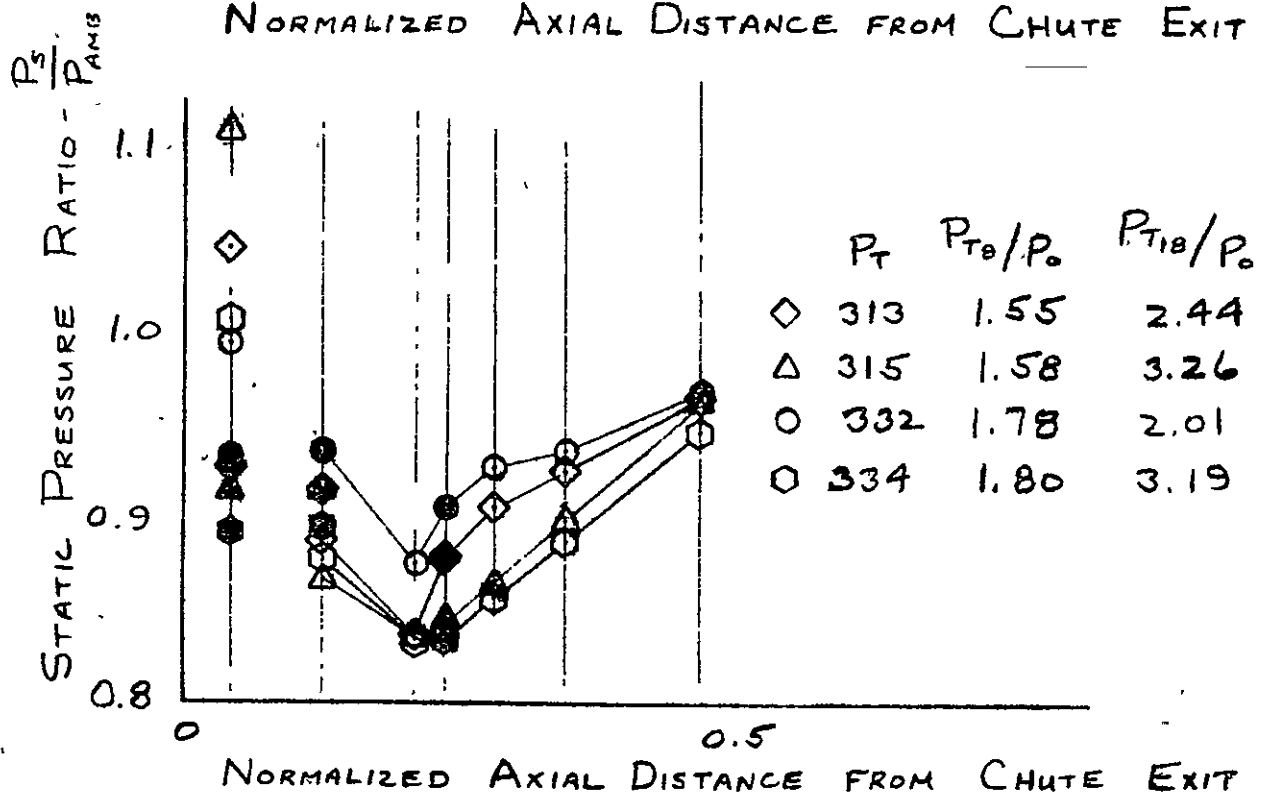
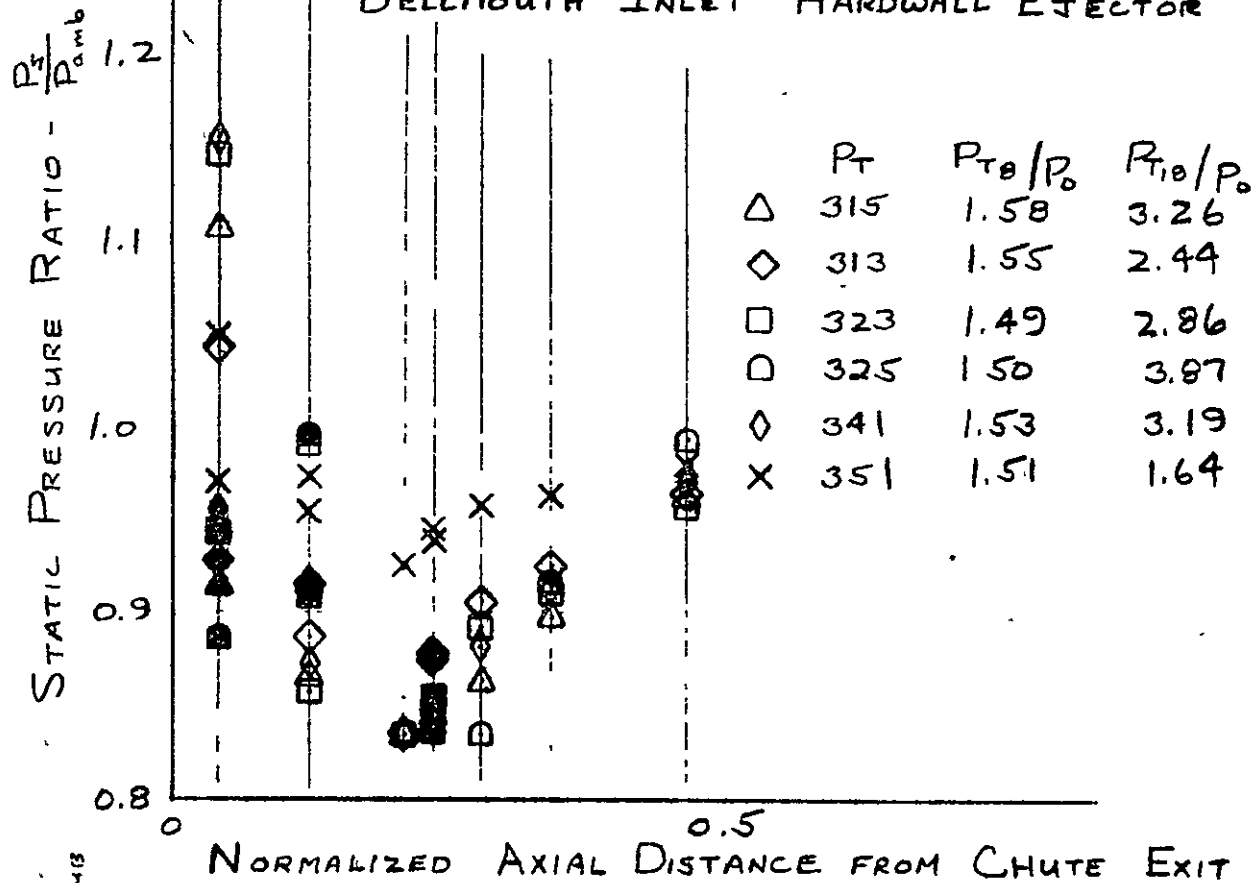
137	1	13.880
143	2	13.955
149	4	13.967
155	5	14.414
161	6	14.079
	8	13.803
	9	13.769

11/11

MODEL #3

MULTI-CHUTE SUPPRESSOR WITH

BELLMOUTH INLET HARDWALL EJECTOR

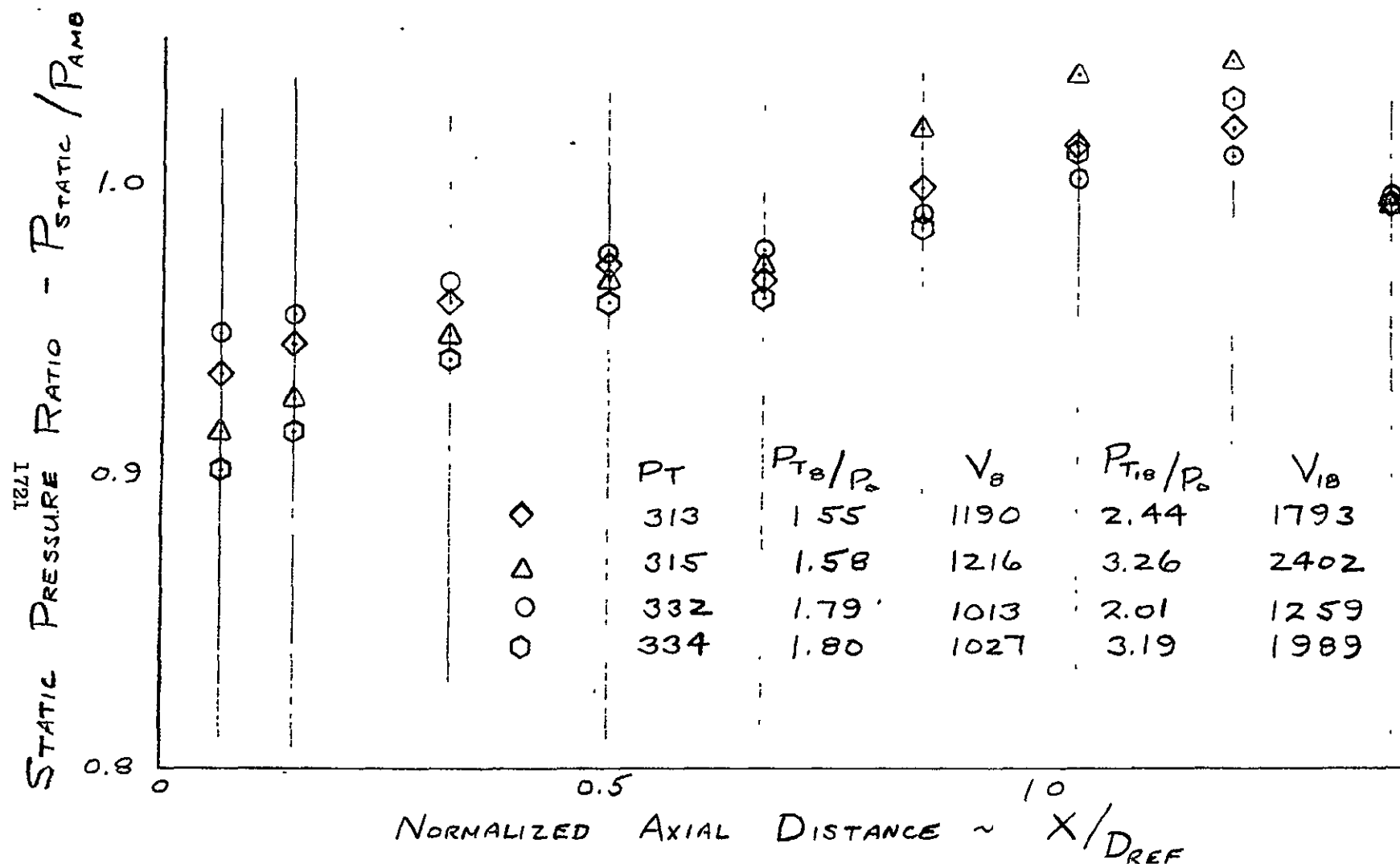


FAN PLUG PRESSURE DISTRIBUTIONS

1720

8-30 PHH
26 Sept 75

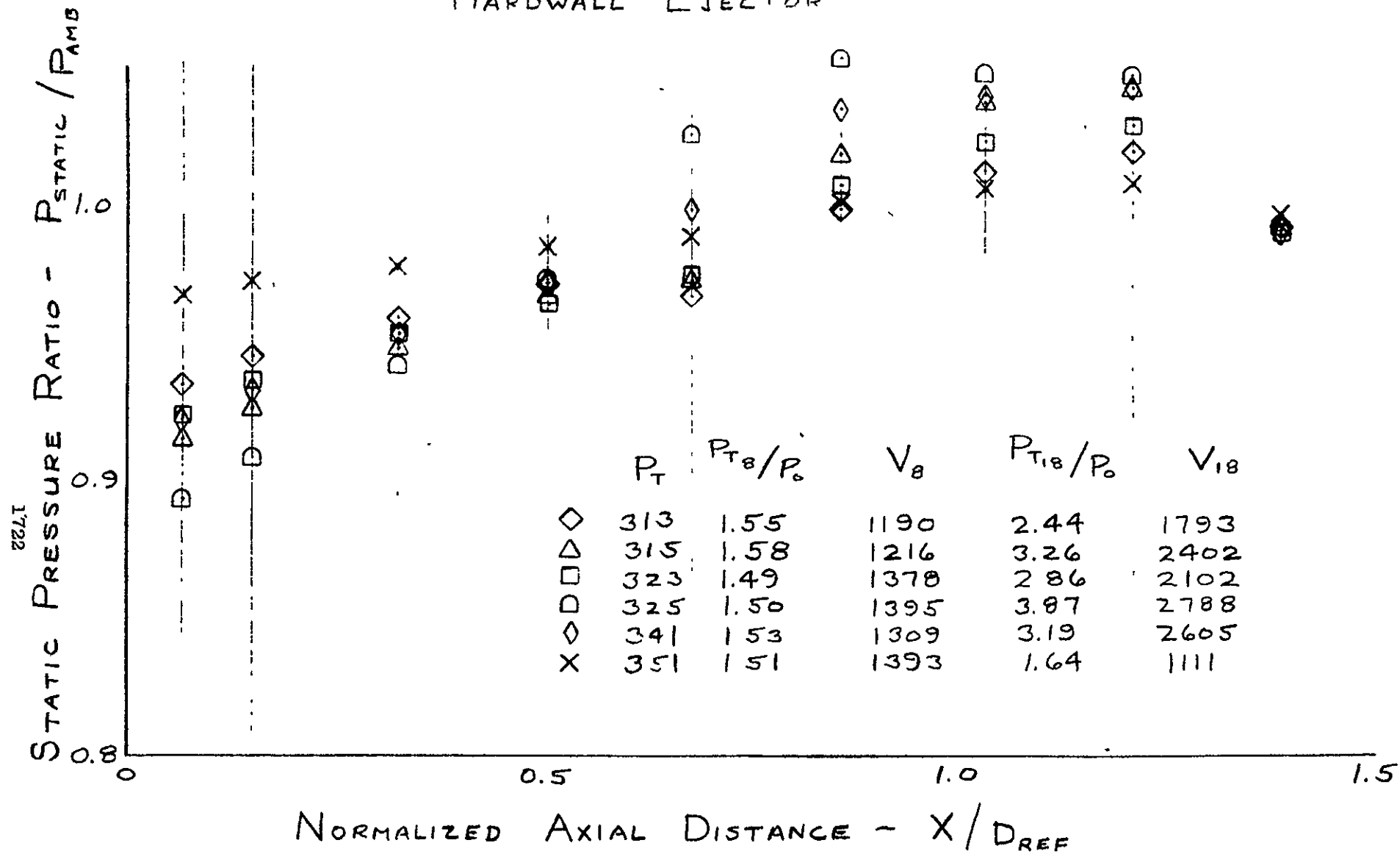
MULTI-CHUTE SUPPRESSOR WITH BELLMOUTH INLET HARDWALL EJECTOR



EJECTOR SHROUD PRESSURE DISTRIBUTIONS
MODEL # 3

ORIGINAL PAGE IS
OF POOR QUALITY

MULTI CHUTE SUPPRESSOR WITH BELLMOUTH INLET HARDWALL EJECTOR



158

EJECTOR SHROUD PRESSURE DISTRIBUTIONS
MODEL # 3

29 Sept 1975

P_T

MODEL # 3

HARDWALL EJECTOR-CHUTES

EJECTOR STATICS

EC	LINE	P_s psia	P_s/P_0
	GE	X	
63	112	.40	
64	118	.90	
65	124	1.96	
66	130	3.02	
67	136	4.08	
68	142	5.14	
69	148	6.20	
70	154	7.26	
71	172	8.32	

Fan Plug Statics

LINE	FEC	P_s psia	P_s/P_0
GE		X	X
160	37	.265	.014
166	38	.725	.121
113	41	1.415	.236
119	43	.265	.044
125	44	.125	.121
131	46	1.242	.207
137	47	1.415	.236
143	48	1.682	.281
149	49	2.035	.333
155	51	2.79	.465

$P_{amb.}$

$P_0 =$ psia

CHUTE BASE

	P_s psia	P_s/P_0
161	52	
167	54	
173	56	

P_T/P_0 T_T V_T

FAN

CORE

433

Model #1

Multi-CHARGE

TAN PLUG

FEC N-ANAL 4 CH
Chute Exit

51	2.79	2.38	355°	Δ = 0.41°
50	2.41	2.00	345°	
49	2.035	1.625	335°	
48	1.682	1.272	355°	
47	1.415	1.005	345°	EXIT
46	1.242	.832	335°	
45	1.09	.680	355°	
44	.725	.315	345°	
43	.265	-.145	335°	Chute
42	.19	-.220	355°	
41	1.415	1.005	90°	
40	1.242	.832	80°	
39	1.090	.680	70°	
38	.725	.315	90°	
37	.265	-.145	80°	
36	.190	-.220	70°	

Flow	155
	149
	143
	137
Corner	131
	125
	119
Chute	113
	172
	166
	160
	154

Chute Base
T-RADIUS

52	3.83	0°	161
53	3.98	10°	
54	4.13	20°	167
55	4.28	30°	
56	4.43	40°	173
57	4.58	50°	
58	4.72	60°	

g.34

MODEL # 3

HARDWALL EJECTOR CHUTES BELLMOUTH

EJECTOR STATICS

LINE	P_s psia	P_s/P_0
112	13.511	.935
118	13.648	.945
124	13.848	.959
130	14.042	.972
136	13.973	.967
142	14.412	.998
148	14.621	1.012
154	14.710	1.018
172	14.327	.992

Fan Plug Statics

LINE	P_s psia	P_s/P_0
160	13.400	.928
166	13.227	.916
113	12.696	.879
119	15.066	1.043
125	12.831	.888
131	12.071	.836
137	12.690	.878
143	13.094	.906
149	13.347	.924
155	13.928	.964

$P_{amb.}$

$$P_0 = 14.445 \text{ psia}$$

CHUTE BASE

	P_s psia	P_s/P_0
161	13.379	.926
167	13.434	.930
173	13.245	.917

P_T/P_0

T_T

V_T

FAN

2.44

1182

1793

CORE

1.55

995

1190

P_T 315

MODEL #3

HARDWALL EJECTOR CHUTES BELLMOUTH

EJECTOR STATICS

LINE	<u>P_s</u> psia	<u>P_s/P₀</u>
112	13.206	.915
118	13.368	.926
124	13.685	.948
130	13.962	.967
136	14.036	.972
142	14.703	1.018
148	14.954	1.036
154	15.028	1.041
172	14.305	.991

Fan Plug Statics

LINE	<u>P_s</u> psia	<u>P_s/P₀</u>
160	13.174	.914
166	13.205	.915
113	12.166	.843
119	16.005	1.109
125	12.508	.866
131	12.019	.833
137	12.127	.840
143	12.452	.863
149	12.970	.898
155	13.874	.961

P_{amb.}

P₀ = 14.435 psia

CHUTE BASE

	<u>P_s</u> psia	<u>P_s/P₀</u>
161	12.878	.892
167	13.370	.926
173	13.163	.912

P_T/P₀

T_T

V_T

FAN 3.265 1652 2402

CORE 1.58 1008 1216

gjk

PT 323

MODEL # 3

HARDWALL EJECTOR CHUTES

EJECTOR STATICS

LINE	P_s psia	P_s/P_0
112	13.334	.924
118	13.496	.936
124	13.751	.953
130	13.976	.969
136	14.056	.974
142	14.519	1.0065
148	14.746	1.022
154	14.834	1.028
172	14.285	.990

Fan Plug Statics

LINE	P_s psia	P_s/P_0
160	13.585	.942
166	13.134	.910
113	12.314	.854
119	16.558	1.148
125	12.376	.858
131	12.013	.833
137	12.262	.850
143	12.865	.892
149	13.129	.910
155	13.823	.958

CHUTE BASE

	P_s psia	P_s/P_0
161	13.315	.923
167	13.377	.927
173	13.153	.912

$P_{amb.}$
 $P_0 = 14.425$ psia

	P_T/P_0	T_T	V_T
FAN	2.86	1405	2102
CORE	1.49	1450	1378

(2)

P_T 325

MODEL #3

HARDWALL EJECTOR - CHUTES BELL MOUTH

EJECTOR STATICS

LINE	<u>P_s</u> psia	<u>P_s/P₀</u>
112	12.887	.894
118	13.099	.909
124	13.580	.942
130	14.031	.973
136	14.781	1.025
142	15.161	1.052
148	15.100	1.047
154	15.076	1.046
172	14.301	.992

Fan Plug Statics

LINE	<u>P_s</u> psia	<u>P_s/P₀</u>
160	12.777	.886
166	14.374	.997
113	12.005	.833
119	18.032	1.251
125	14.273	.990
131	12.005	.833
137	12.004	.833
143	12.004	.833
149	13.193	.915
155	14.302	.992

P_{amb.}

P₀ = 14.416 psia

CHUTE BASE

	<u>P_s</u> psia	<u>P_s/P₀</u>
161	12.643	.877
167	13.439	.932
173	13.360	.927

P_T/P₀

T_T

V_T

FAN 3.87 1978 2788

CORE 1.50 1470 139.5

g₁² T

P_T 341

MODEL #3

HARDWALL EJECTOR CHUTES

EJECTOR STATICS

LINE	<u>P_s</u> psia	<u>P_s/P₀</u>
112	13.300	.922
118	13.455	.933
124	13.744	.953
130	14.020	.972
136	14.373	.998
142	14.903	1.034
148	14.982	1.039
154	15.011	1.041
172	14.258	.989

Fan Plug Static

LINE	<u>P_s</u> psia	<u>P_s/P₀</u>
160	13.765	.955
166	13.218	.917
113	12.244	.849
119	16.680	1.157
125	12.576	.872
131	12.008	.833
137	12.237	.849
143	12.697	.881
149	13.144	.912
155	13.979	.970

CHUTE BASE

	<u>P_s</u> psia	<u>P_s/P₀</u>
161	13.168	.913
167	13.463	.934
173	13.325	.924

P_{amb.}

P₀ = 14.418 psia

P_T/P₀

T_T

V_T

FAN 3.19 1966 2605

CORE 1.53 1243 1309

8.29

P_T 351

MODEL # 3

HARDWALL EJECTOR-CHUTES

EJECTOR STATICS

LINE	P_s psia	P_s/P_0
112	13.968	.967
118	14.034	.972
124	14.127	.978
130	14.225	.985
136	14.266	.988
142	14.443	1.000 +
148	14.510	1.005
154	14.544	1.007
172	14.376	.996

Fan Plug Statics

LINE	P_s psia	P_s/P_0
160	14.001	.970
166	13.780	.954
113	13.554	.939
119	15.138	1.048
125	14.021	.971
131	13.331	.923
137	13.613	.943
143	13.772	.954
149	13.875	.961
155	14.141	.979

CHUTE BASE

	P_s psia	P_s/P_0
161	13.787	.955
167	13.756	.953
173	13.700	.949

P_{amb.}

P₀ = 14.440 psia

P_T/P₀

T_T

V_T

FAN

1.64

778

1111

CORE

1.51

1450

1393

6-41

P_T 332

MODEL # 3

HARDWALL EJECTOR CHUTES

EJECTOR STATICS

LINE	<u>P_s</u> psia	<u>P_s/P₀</u>
112	13.697	.9485
118	13.797	.955
124	13.950	.966
130	14.100	.976
136	14.165	.977
142	14.282	.989
148	14.471	1.002
154	14.572	1.009
172	14.370	.995

Fan Plug Statics

LINE	<u>P_s</u> psia	<u>P_s/P₀</u>
160	13.466	.932
166	13.518	.936
113	13.063	.905
119	14.333	.993
125	13.519	.936
131	12.637	.875
137	13.084	.906
143	13.405	.928
149	13.531	.937
155	13.979	.968

P_{amb.}

P₀ = 14.440 psia

CHUTE BASE

	<u>P_s</u> psia	<u>P_s/P₀</u>
161	13.563	.939
167	13.487	.934
173	13.447	.931

P_T/P₀

T_T

V_T

FAN 2.01 728 1259

CORE 1.79 556 1013

P_T 334

MODEL # 3

HARDWALL EJECTOR-CHUTES

EJECTOR STATICS

LINE	<u>P_s</u> psia	<u>P_s/P₀</u>
112	13.028	.902
118	13.218	.915
124	13.566	.939
130	13.851	.959
136	13.864	.960
142	14.214	.984
148	14.576	1.010
154	14.846	1.028
172	14.328	.992

Fan Plug Statics

LINE	<u>P_s</u> psia	<u>P_s/P₀</u>
160	12.889	.892
166	12.915	.894
113	12.058	.835
119	14.546	1.007
125	12.665	.877
131	12.026	.832
137	12.089	.837
143	12.386	.857
149	12.818	.887
155	13.679	.947

P_{amb.}

P₀ = 14.447 psia

CHUTE BASE

	<u>P_s</u> psia	<u>P_s/P₀</u>
161	12.312	.894
167	13.135	.909
173	12.768	.898

P_T/P₀

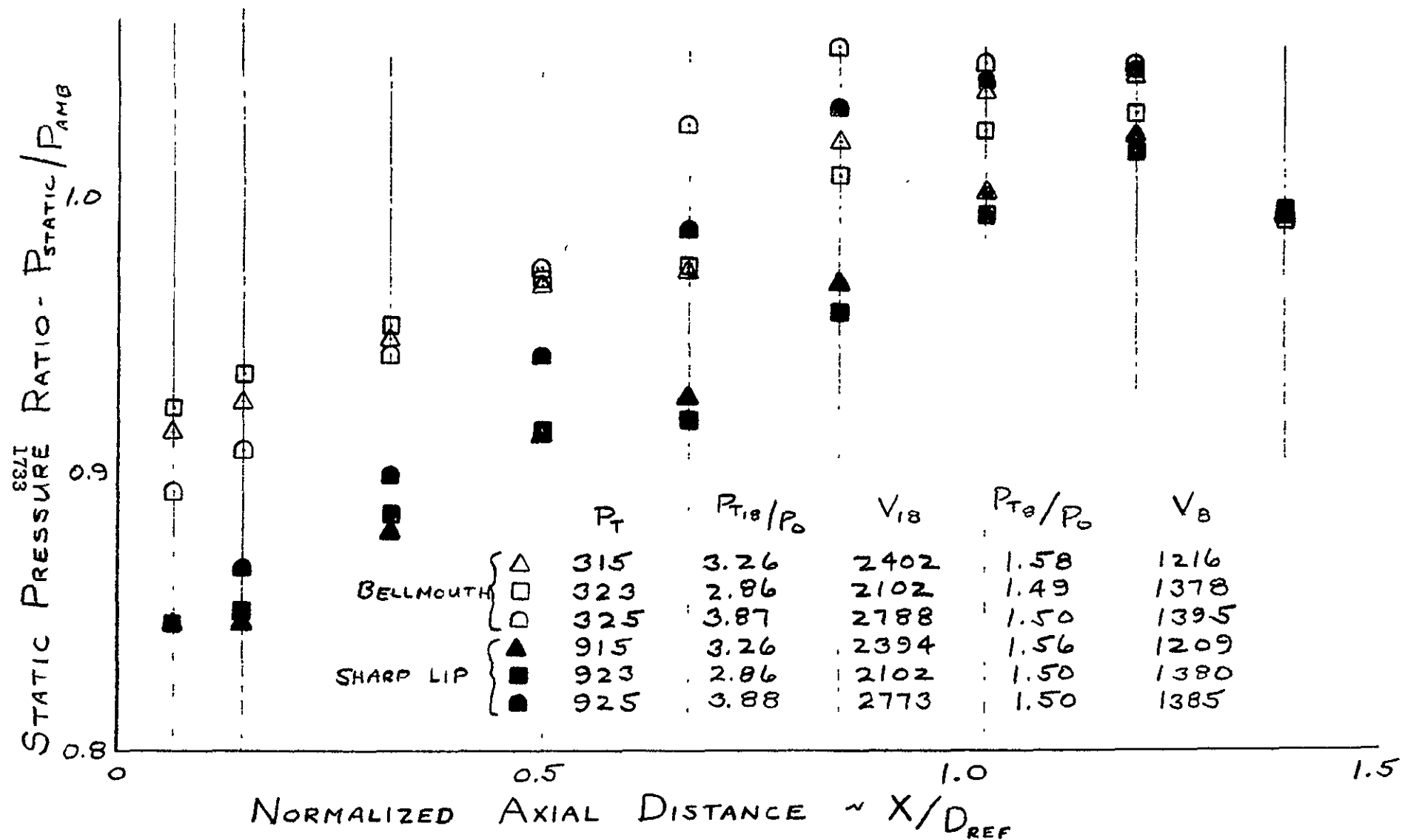
T_T

V_T

FAN 3.19 1163 1989

CORE 1.80 570 1027

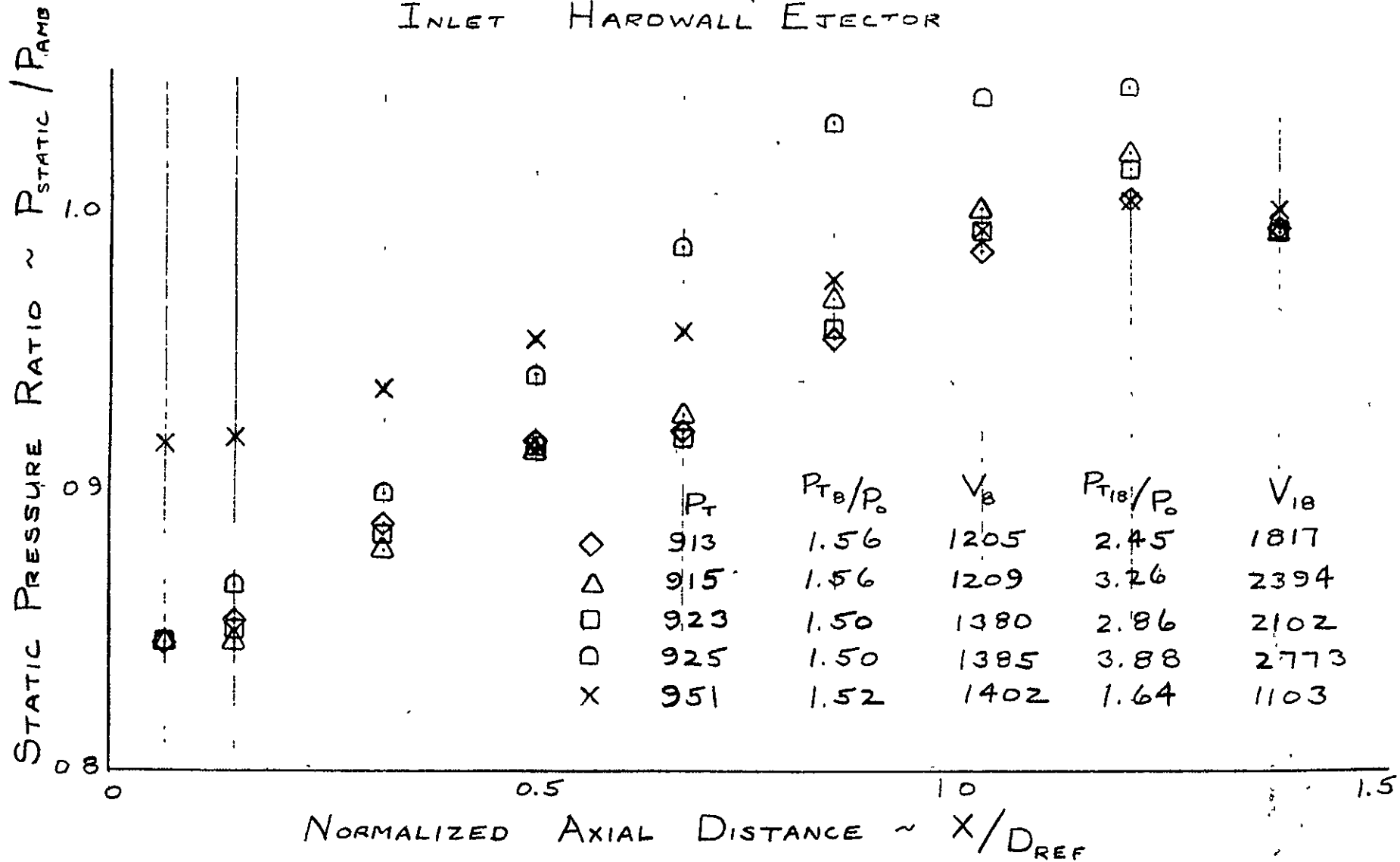
MULTI-CHUTE SUPPRESSOR WITH HARDWALL EJECTOR



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MULTI-CHUTE SUPPRESSOR WITH SHARP LIP INLET HARDWALL EJECTOR

1734



EJECTOR SHROUD PRESSURE DISTRIBUTIONS
MODEL * 9

8-14-8

P_T 913

MODEL # 9

HARDWALL EJECTOR CHUTES SHARP LIP

EJECTOR STATICS

LINE	<u>P_s</u> psia	<u>P_s/P₀</u>
112	12.221	.846
118	12.338	.854
124	12.828	.888
130	13.269	.918
136	13.308	.921
142	13.783	.954
148	14.234	.985
154	14.503	1.004
	14.368	.994

Fan Plug Statics

LINE	<u>P_s</u> psia	<u>P_s/P₀</u>
112	12.219	.846
166	13.454	.931
113	12.043	.833
119	15.464	1.070
125	13.054	.903
131	12.043	.833
137	12.043	.833
143	12.175	.842
149	12.370	.856
155	13.194	.913

CHUTE BASE

	<u>P_s</u> psia	<u>P_s/P₀</u>
161	14.054	.972
167	14.176	.981
173	14.179	.981

P_{amb.}
P₀ = 14.451 psia

	<u>P_T/P₀</u>	<u>T_T</u>	<u>V_T</u>
FAN	2.45	1209	1817
CORE	1.56	1005	1205

MODEL # 9

P_T 915

HARDWALL EJECTOR-CHUTES SHARP LIP

EJECTOR STATICS

LINE	<u>P_s</u> psia	<u>P_s/P₀</u>
112	12.221	.846
118	12.219	.846
124	12.702	.879
130	13.203	.914
136	13.389	.927
142	13.985	.968
148	14.450	1.000
154	14.740	1.020
0 154	14.330	.992

Fan Plug Statics

LINE	<u>P_s</u> psia	<u>P_s/P₀</u>
172 172	12.220	.846
166	13.609	.942
113	12.043	.833
119	16.137	1.117
125	13.097	.906
131	12.041	.833
137	12.040	.833
143	12.041	.833
149	12.041	.833
155	13.183	.912

P_{amb.}

P₀ = 14.450 psia

CHUTE BASE

	<u>P_s</u> psia	<u>P_s/P₀</u>
161	14.113	.977
167	14.134	.978
173	14.160	.980

P_T/P₀

T_T

V_T

FAN

3.26

1643

2394

CORE

1.56

1013

1209

P_T 923

MODEL # 9

HARDWALL EJECTOR CHUTES SHARP LIP

EJECTOR STATICS

Fan Plug Static

LINE P_s psia P_s/P_0

LINE P_s psia P_s/P_0

112 12.219 .8465
118 12.261 .85
124 12.776 .885
130 13.203 .915
136 13.265 .919
142 13.806 .957
148 14.308 .992
154 14.635 1.014
160 ~~14.343~~ .993

172 ~~12.217~~ .8465
166 13.535 .9375
113 12.039 .8335
119 16.664 1.154
125 12.832 .889
131 12.040 .8335
137 12.039 .8335
143 12.039 .8335
149 12.115 .84
155 13.125 .909

CHUTE BASE

P_s psia P_s/P_0
161 14.013 .97
167 14.162 .9815
173 14.165 .9815

P_{amb.}

P₀ = 14.447 psia

P_T/P_0 T_T V_T

FAN 2.86 1404 2102

CORE 1.50 1451 1380

2.117

MODEL # 8 # 9

Pt 925

HARDWALL EJECTOR - CHUTES SHARP LIP

EJECTOR STATICS

LINE	P_s psia	P_s/P_o
112	12.219	.846
118	12.514	.866
124	12.991	.899
130	13.591	.941
136	14.261	.987
142	14.808	1.0305
148	15.022	1.040
154	15.077	1.044
154	14.325	.992

LINE
172 165
166
113
119
125
131
137
143
149
155

Fan Plug Statics

P_s psia	P_s/P_o
12.217	.846
14.474	1.002
12.040	.833
17.838	1.235
15.102	1.045
12.040	.833
12.041	.833
12.040	.833
12.543	.862
13.966	.967

$P_{amb.}$

$P_o = 14.447$ psia

CHUTE BASE

	P_s psia	P_s/P_o
161	13.293	.920
167	14.054	.973
173	14.178	.981

P_T/P_o T_T V_T

FAN 3.88 1957 2773

CORE 1.50 1463 1385

PT 951

MODEL # 9

HARDWALL EJECTOR - CHUTES SHARP LIP

EJECTOR STATICS

Fan Plug Statics

LINE	P_s psia	P_s/P_o
112	13.249	.917
118	13.278	.919
124	13.518	.936
130	13.787	.954
136	13.805	.956
142	14.068	.974
148	14.329	.992
154	14.484	1.003
154	14.449	1.0003

LINE	P_s psia	P_s/P_o
172 166	13.031	.902
166	13.813	.956
113	13.117	.908
119	15.289	1.058
125	13.833	.958
131	12.965	.898
137	13.207	.914
143	13.351	.924
149	13.395	.927
155	13.739	.951

CHUTE BASE

	P_s psia	P_s/P_o
161	14.221	.984
167	14.309	.991
173	14.300	.990

$P_{amb.}$

$P_o = 14.445$ psia

	P_T/P_o	T_T	V_T
FAN	1.64	765	110.3
CORE	1.52	1454	1402

Pt 508

MODEL *5

HARDWALL EJECTOR

CORE PLUG STATICS

psia

112 12.149

130 13.948

148 12.149

166 14.608

119 14.952

131 15.904

EJECTOR STATICS

psia

118 13.109

124 13.262

136 13.524

142 13.716

154 13.915

160 14.375

172 14.532

113 14.617

125 14.259

FAN PLUG STATICS

psia

137 12.669

143 12.852

149 12.564

155 14.256

161 13.006

167 12.433

173 12.512

$P_{amb} = 14.376$ psia

P_T/P_0 T_T V_J

FAN 2.26 1056 1625

CORE 1.630 766 1075

1740

Pt 510

MODEL #5

HARDWALL EJECTOR

CORE PLUG
STATICS

psia

112 12.142

130 13.730

148 12.141

166 14.643

119 15.166

131 16.102

EJECTOR
STATICS

psia

118 12.715

124 12.872

136 13.165

142 13.425

154 13.697

160 14.342

172 14.641

113 14.848

125 14.131

FAN PLUG
STATICS

psia

137 11.958

143 12.147

149 11.954

155 ~~14.262~~

161 12.396

167 11.955

173 11.954

$P_{amb} = 14.376$ psia

P_T/P_0 T_T V_T

FAN 2.99 1481 2198

CORE 1.64 768 1104

1741

0.51

Pt 5.20

MODEL #5

HARDWALL EJECTOR

CORE PLUG STATICS

psia

112	12.150
130	13.607
148	12.150
166	14.516
119	15.213
131	15.911

EJECTOR STATICS

psia

118	12.554
124	12.682
136	13.001
142	13.304
154	13.642
160	14.336
172	14.686
113	14.995
125	14.073

FAN PLUG STATICS

psia

137	11.966
143	11.964
149	11.964
155	14.206
161	12.253
167	11.963
173	11.963

$$P_{amb} = 14.381 \text{ psia}$$

$$P_T/P_0 \quad T_T \quad V_T$$

FAN 3.54 1788 2573

CORE 1.54 1219 1310

P-551

MODEL #5

HARD WALL EJECTOR

CORE PLUG
STATICS
psia

EJECTOR
STATICS
psia

112	12.143	.845
118		
124		
130	13.998	
136		
142		
148	12.142	.845
154		
160		
166	14.420	
172		
113		
119	14.733	
125		
131	15.501	

13.686	.9525
13.781	
13.931	
14.029	
14.109	
14.319	
14.441	
14.476	
14.327	

FAN PLUG
psia

$P_{amb} = 14.378$ psia

	FAN	CORE
137	13.405	.933
143	13.536	.942
149	13.421	.934
155	14.142	
161	13.665	.952
167	13.501	.940
173	13.398	.932

P_T/P_0	T_T	V
1.52	1439	1395
1.64	769	1102

Pt 525

MODEL *5

HARDWALL EJECTOR

CORE PLUG STATICS

psia

112 12.150

130 13.632

148 12.150

166 14.549

119 15.1282

131 15.834

EJECTOR STATICS

psia

118 12.574

124 12.679

136 12.992

142 13.309

154 13.682

160 14.409

172 14.740

113 15.111

125 13.982

FAN PLUG STATICS

psia

137 11.968

143 11.964

149 11.965

155 ~~14.205~~

161 11.965

167 11.964

173 11.963

$P_{amb} = 14.381$ psia

P_r/P_o T_r V_J

FAN 3.87 1763 2776

CORE 1.50 1460 13901

1744

Pt 5 13

MODEL #5

HARDWALL EJECTOR

CORE PLUG STATICS

psia

EJECTOR STATICS

psia

112	12.150	118	12.954
		124	13.129
130	13.828	136	13.430
		142	13.651
148	12.150	154	13.872
		160	14.404
166	14.545	172	14.580
		113	14.673
119	14.978	125	14.252
131	15.785		

FAN PLUG STATICS

psia

$P_{amb} = 14.381$ psia

P_T/P_0 T_T V_T

137	12.385	FAN	2.45	1207	1815
143	12.612				
149	12.514				
155	14.226				
161	12.873	CORE	1.57	988	1198
167	11.971				
173	12.260				

Pt 515

MODEL *5

HARDWALL EJECTOR

CORE PLUG STATICS

psia

112 12.151

130 13.648

148 12.151

166 14.525

119 15.168

131 15.950

EJECTOR STATICS

psia

118 12.591

124 12.748

136 13.058

142 13.355

154 13.652

160 14.331

172 14.670

113 14.925

125 14.130

FAN PLUG STATICS

psia

137 11.966

143 12.000

149 11.964

155 ~~14.217~~

161 12.387

167 11.964

173 11.964

$P_{amb} = 14.382$ psia

P_T/P_0 T_T V_T

FAN 3.26 1635 238.8

CORE 1.57 988 1199

Pt 503

MODEL #5

HARDWALL EJECTOR

CORE PLUG STATICS

psia

112 12.142

63 118

64 124

130 14.124

65 136

66 142

148 12.142

67 154

68 160

166 14.954

69 172

70 113

119 14.954

71 125

131 16.119

EJECTOR STATICS

psia

13.236

13.700

13.602

13.778

13.925

14.277

14.506

14.573

14.304

FAN PLUG STATICS

psia

137 12.867

143 13.017

149 12.875

155 ~~14.206~~

161 13.241

167 13.047

173 12.897

$P_{amb} = 14.38$ psia

P_T/P_0 T_T V_T

FAN 2.06 1002 1501

CORE 1.80 536 1000

P_T 505

MODEL *5

HARDWALL EJECTOR

CORE PLUG STATICS

psia

EJECTOR STATICS

psia

112 12.142

130 13.840

148 12.140

166 14.802

119 15.190

131 16.362

118 12.809

124 12.968

136 13.247

142 13.482

154 13.774

160 14.418

172 14.614

113 14.772

125 14.190

FAN PLUG STATICS

psia

137 12.126

143 12.376

149 12.136

155 14.233

161 12.593

167 11.953

173 11.974

P_{amb} = 14.377 psia

P_T/P₀ T_T V_T

FAN 2.73 1343 2014

CORE 1.80 545 1006

P_T 534

MODEL *5

HARDWALL EJECTOR

CORE PLUG STATICS

psia

EJECTOR STATICS

psia

112 12.276 .846 ?

118 12.410 .856

124 12.611 .87

130 13.976 .964

136 12.783 .895

142 13.300 .917

148 12.276 .846 ?

154 13.544 .933

160 14.021 .966

166 14.285 .984

172 14.576 1.005

119 15.340 1.057

113 14.943 1.030

131 16.558 1.141

125 14.367 .988

FAN PLUG STATICS

psia

P_{amb} = 14.514 psia

P_T/P₀ T_T V_T

137 12.094 }
143 12.094 } Cavity
P_s .834

FAN 3.17 1170 1992

149 12.094 }

155 14.683 1.011

161 12.224 .843

CORE 1.81 551 1018

167 12.094 } Cavity
173 12.094 } P_s

P_T 536.

MODEL *5

HARDWALL EJECTOR

CORE PLUG
STATICS

psia

112 12.256 .846

130 13.798 .953

148 12.256 .846

166 14.480 .999⁺

119 15.124 1.045

131 16.106 1.112

FAN PLUG
STATICS

psia

137 12.016 }
143 12.075 } .834

149 12.075 }

155 14.604 1.009

161 12.356 .854

167 12.075 }
173 12.075 } .834

EJECTOR
STATICS

psia

118 12.393 .856

124 12.625 .872

136 13.023 .90

142 13.315 .92

154 13.547 .936

160 13.917 .962

172 14.464 .999

113 14.812 1.024

125 14.321 .989

P_{amb} = 14.494 psia

P_T/P₀

T_T

V_J

FAN 3.05 806 1628

CORE 1.63 761 1092

*2, *6
*4

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PT 726

MODEL #7

CORE PLUG
STATICS
psia

FAN PLUG
STATICS
psia

112 13.963
118 14.847
124 14.891
130 14.563
136 14.251
142 14.067
148 12.269
154 13.715
160 14.339
166 14.490
172 14.703
113 14.804
119 14.765
125 15.263
131 15.382

137 14.502
143 14.502
149 14.502
155 14.500
161 14.500
167 14.502
173 14.500

$P_{amb} \sim 14.504$ psia

FAN

P_T/P_0 T_T V_T
1.524 717 989

CORE

1.369 1004 1018

*2, *6
*1, *4

15/2

P_T 728

MODEL # 7

CORE PLUG
STATICS
psia

FAN PLUG
STATICS
psia

112	14.785	1.021
118	15.659	1.081
124	15.740	1.086
130	15.212	1.050
136	14.681	1.013
142	14.131	.975
148	12.270	.847
154	13.765	
160	14.368	
166	14.579	
172	14.862	
113	15.009	
119	15.002	
125	15.495	
131	15.613	

137	Amb
143	✓
149	✓
155	✓
161	✓
167	✓
173	✓

P_{amb} ~ 14.498 psia

P _T /P ₀	T _r	V _J
FAN 2.734	1354	2024

CORE	1.389	992	1035
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*2, *6
*1, *4

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15/21

MODEL #7

PT 730
(FEC 20)

CORE PLUG
STATICS
psia

FAN PLUG
STATICS
psia

112	13.775	.952	137	Amb
118	16.969	1.173	143	✓
124	17.404	1.202		
130	16.132	1.115	149	✓
136	15.705	1.086	155	✓
142	14.388	.994	161	Amb
148	12.252	.865		
154	12.250	.864	167	✓
160	12.249	.863	173	✓
166	14.222	.903		
172	15.981	1.105		
113	15.657	1.081		
119	15.275	1.055		
125	16.294	1.125		
131	16.679	1.153		

$P_{amb} \sim 14.475$ psia

FAN

2.861

1415

2110

CORE

1.869

1003

1406

*2, *6
*1, *4

17/2

MODEL # 7

PT 731
(FEC 21)

CORE PLUG
STATICS
psia

FAN PLUG
STATICS
psia

CAVITY 112	12.411	.848	137	Amb
" 118	12.410	.848	143	✓
124	16.271	1.111		
130	16.679	1.140	149	✓
136	16.822	1.149	155	✓
142	14.697	1.004	161	✓
CAVITY 148	12.412	.848		
" 154	12.410	.848	167	✓
160	12.420	.8485	173	✓
166	13.739	.938		
172	15.631	1.068		
113	15.933	1.089		
119	15.788	1.078		
125	16.758	1.132		
131	17.187	1.174		

$P_{amb} \approx 14.645$ psia

P_T/P_0 T_T V_J

FAN

3.864 1965 2777

CORE

1.86 1002 1409